AVIATION WEEK

APR. 14, 1952

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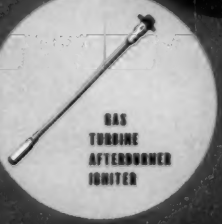

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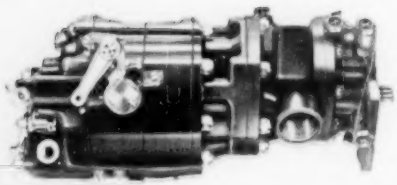

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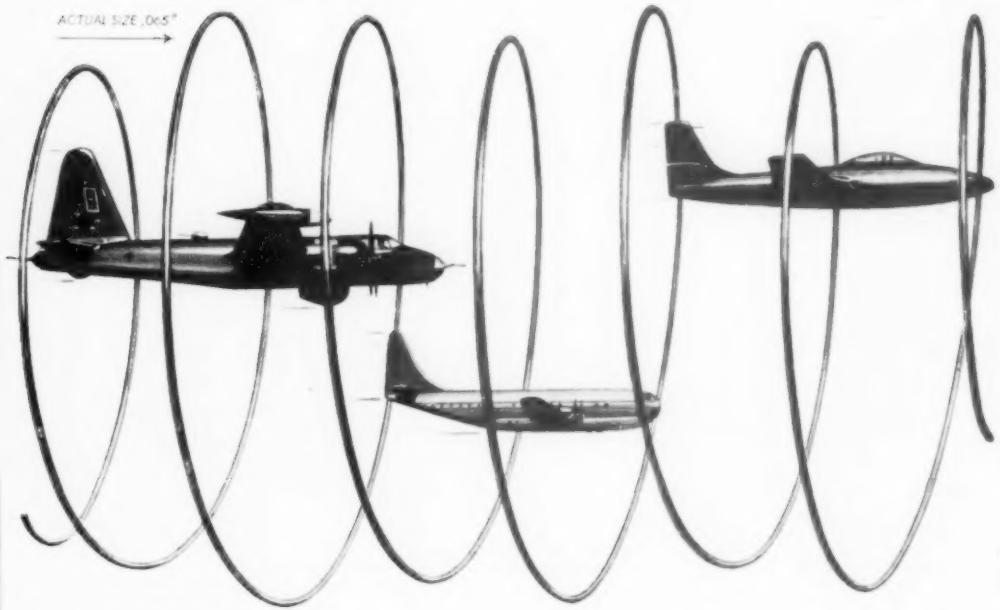

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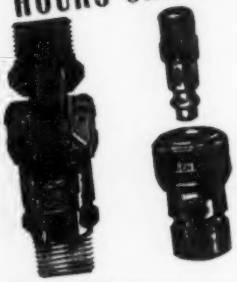

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Aviation Week

ABP Member ABC

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First Machine Gun Fired From a Plane

★

Back on June 7, 1912, Colonel Isaac M. Lewis, the inventor of the Lewis machine gun, took one of his first sample guns to College Park, Maryland, and asked that it be tried from an airplane. The commanding officer of the U. S. Army flying school there, Captain C. de F. Chandler, agreed to undertake the firing experiment himself and went aloft with his pilot, Lt. Roy T. Kirtland, in a Wright Type B plane.

MODERN VERSION! A far cry from Captain Chandler's first machine gun experiment from the air, is this scene at a Far East air base. The U. S. Air Force ground crewman wears a scarf of "ammo" for the powerful .50 caliber machine guns, as he loads up a B-26 light bomber for a mission against the North Korean Communists.

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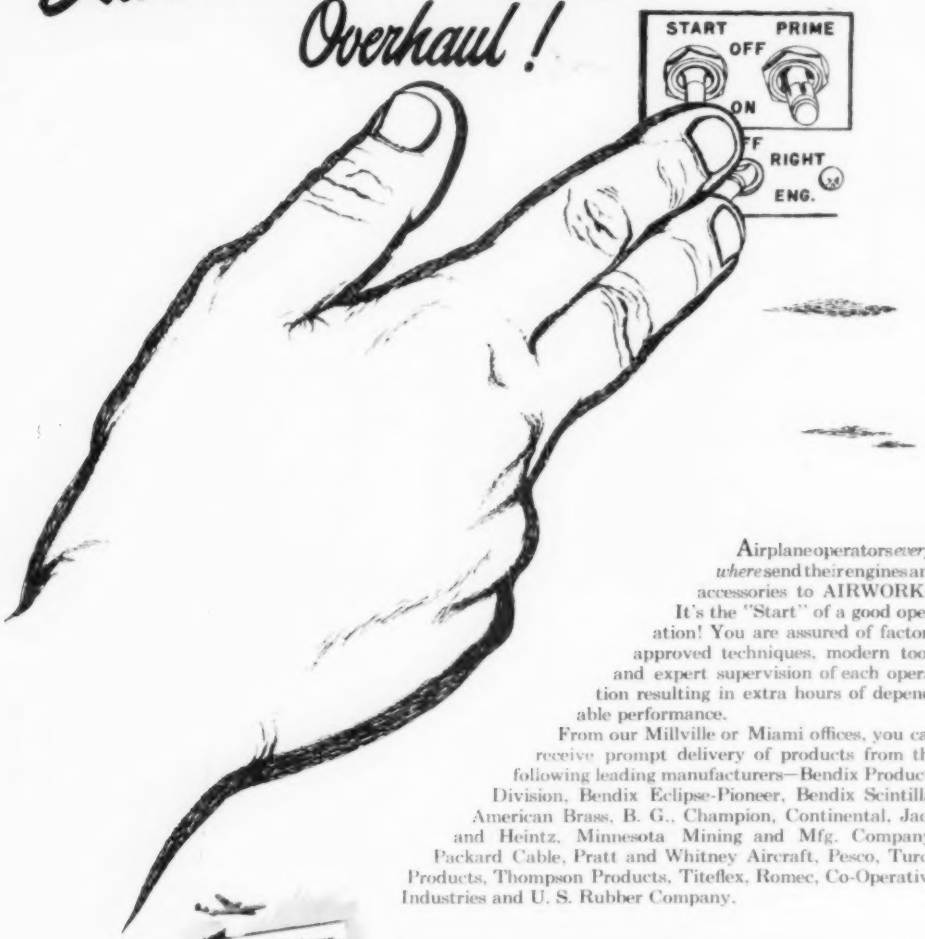

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NEWS DIGEST

DOMESTIC

Civil aircraft shipments in January came to 622,800 lb., totaling 224 planes valued at $12 million. Backlog of civil planes of 3,000 lb. airframe weight and over, amounted to 705 at the end of the month. Engines shipped came to 395.

Bid for 1953 National Air Races has been made by Dayton, Ohio, Chamber of Commerce, which offers Vandalia Municipal Airport as site. Event would tie in with Dayton's observance of 50th anniversary of flight.

USAF is asking bids on 62 surplus machine tools at Marietta and Omaha. Bids will be opened at the former Bell B-29 plant, Marietta, at 10 a.m., Apr. 30. Lists can be obtained by writing Capt. W. A. Atchison, USAF Government Plant No. 6, Marietta, Ga.

Capt. Hugh Herndon, Jr., 47, TWA's director of operations for the Middle and Far East, died in Cairo, Apr. 6. Herndon and Clyde Pangborn made the first Pacific non-stop flight, Japan-U. S., in 1931.

Personal and executive planes shipped during February totaled 187, in one-to-ten-place category. There were 166 four-or-more-placers, 21 two-placers. The shipments, by six companies, were valued at $1,826,000.

Russell Owen, New York Times reporter, died Apr. 3 in Cleveland. Owen covered many important aviation stories, including Cmdr. Richard Byrd's trip to the Antarctic and the Lindbergh, Chamberlin and Levine, Acosta, Balchen and Noville flights.

Bell 47D-1 licenses have been granted to Aersilta Societa Per Azioni, Milan, and Societe National de Constructions Aeronautiques du Nord (SNCAN), Paris. Rotor blades will be made under license by Hordern-Richmond, Ltd., Haddenham, Bucks, England.

Margaret K. Gardner, wife of Maj. Lester D. Gardner, founder of the IAS, died in New York Mar. 29. Burial was in Arlington National Cemetery, Washington, D. C. Mrs. Gardner worked closely with her husband on Aviation Magazine in its early years.

American Airlines has ordered a fleet installation of Scintilla ignition analyzers. All AA planes will be wired to use a portable version of the analyzer; airborne installation on four-engine planes may be made later. The Scintilla Magneto division of Bendix now has sold analyzers to 11 domestic and 13 overseas airlines.

FINANCIAL

Pacific Airmotive Corp., Burbank, Calif., had unaudited net profit of $233,712 in company's first quarter ended Feb. 29, on sales of $6,825,302.

Fairchild Engine & Airplane Corp., Hagerstown, Md., reports net earnings, after federal taxes, of $2,222,130 on sales of $75,234,806 during 1951. Defense contract rescheduling reduced Fairchild's backlog from $249 million to approximately $215 million.

Ryan Aeronautical Co., San Diego, reports backlog of over $70 million with receipt of new orders totaling more than $25 million.

Trans World Airlines earned $8,511,000 after taxes last year, with total operating revenues up 23.9% to $145 million.

Jack & Heintz, Inc., had net sales of $22.7 million in 1951 with net profits of $1,937,500. Backlog is $49 million.

Northwest Airlines, Inc., has declared a regular quarterly dividend of 28.75 cents per share of 4.6% cumulative preferred stock payable May 1 to holders of record Apr. 18.

Marquardt Aircraft Co., Van Nuys, Calif., is offering 20,000 shares of capital stock at $15 per share through underwriting firm of C. E. Unterberg & Co., New York. Marquardt's principal interest is in ramjet engine development.

INTERNATIONAL

Avro-Canada Orenda jet engine production is scheduled at 20 engines monthly for 1953, according to an official statement by the Canadian Department of Defense Production. During second half of February, Avro-Canada received $5.6 million in contracts for work on the Orenda, CF-100 jet fighter and Lancaster bomber. Canadair Ltd., Montreal, was awarded $1.1 million for aircraft training equipment.

Trans-Canada Air Lines has received Dept. of Transport certification to increase Canadair North Star's domestic seating capacity to 48 passengers from 40. TCA will modify 12 North Stars to new seating during 1952.

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AVIATION CALENDAR

Apr. 15-17—American Institute of Electrical Engineers southwest district meeting, Hotel Jefferson, St. Louis; aviation papers Apr. 15-16.

Apr. 15-18—International Federation of Airline Pilots' Assns. annual convention, Sydney, Australia.

Apr. 16—Joint session of Metropolitan New York sections of American Institute of Chemical Engineers, American Society of Civil Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers and American Institute of Mining and Metallurgical Engineers, celebrating Centennial of Engineering; Dr. Vannevar Bush will address the meeting; Engineering Societies Building, 33 W. 39 St., New York; 8 pm.

Apr. 21-24—National Aeronautics Meeting and Aircraft Engineering Display, Society of Automotive Engineers, Hotel Statler, New York; technical air review at Idlewild, Apr. 24.

Apr. 22—Institute of the Aeronautical Sciences meeting, Cleveland-Akron section, Cleveland.

Apr. 28—International Air Transport Assn. Warsaw Convention special committee meeting, Bermuda.

Apr. 30-May 2—American Institute of Electrical Engineers northeastern district meeting, Arlington Hotel, Binghamton, N. Y.; aviation papers Apr. 30.

May 2-4—Sixth annual Intercollegiate Air Meet, Great Barrington, Mass.

May 5-7—Symposium, "Progress in Quality Electronic Components," sponsored by Institute of Radio Engineers, American Institute of Electrical Engineers, and Radio & Television Manufacturers Assn.; technical sessions at Dept. of Interior auditorium; registration at Roger Smith Hotel, Washington, D. C.

May 5-16—International Air Transport Assn. technical conference meeting, Copenhagen.

May 8-9—Fifth annual Wisconsin Aeronautics Conference, Hotel Northland, Green Bay.

May 11—International Air Transport Assn. traffic committee meeting, Buenos Aires.

May 12-14—National conference on airborne electronics, co-sponsored by Institute of Radio Engineers' Dayton section and Professional Group on Airborne Electronics, Dayton Biltmore Hotel, Dayton, Ohio.

May 15-16—American Helicopter Society annual forum and banquet, Hotel Washington, Washington, D. C.

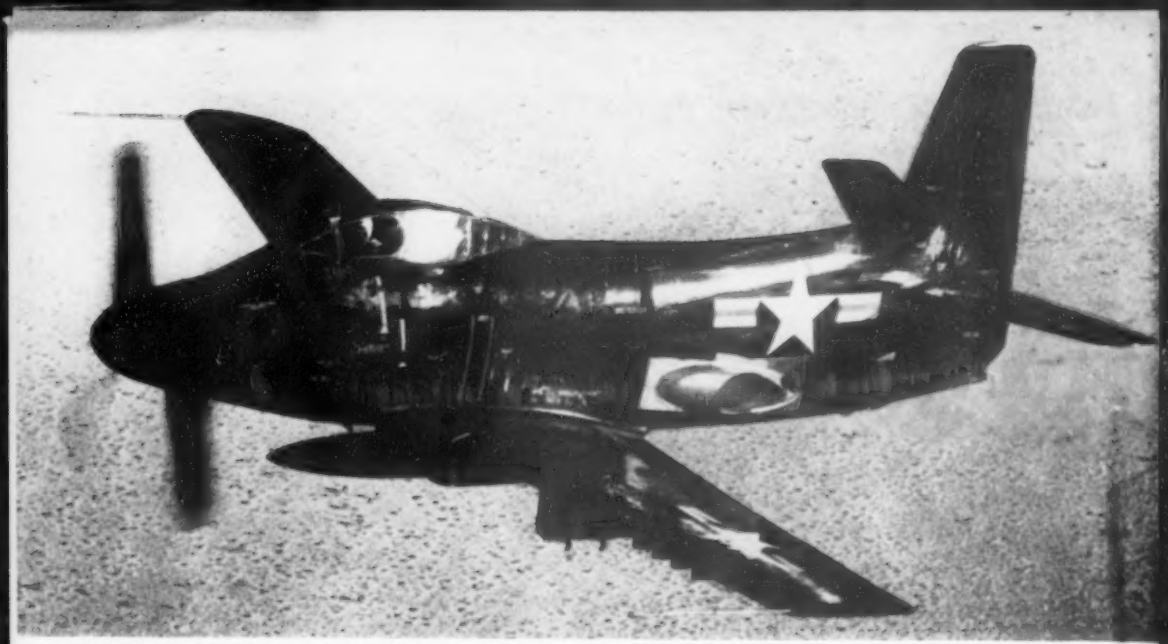
May 17-18—National Pilots Air Meet and Races, Chattanooga.

May 19—International Air Transport Assn. technical committee and medical committee meeting, Copenhagen.

June 9-13—National Fire Protection Assn. annual meeting; aviation seminar on June 10, Hotel Statler, New York.

PICTURE CREDITS

9—(top) Douglas Aircraft Corp.; (center) General Electric; 14—Defense Department; 15—Lockheed; 18—Wide World; 21, 22, 29—General Electric; 56—United Aircraft Corp.; 58—Solar Aircarft Corp.; 61—USN.



SKYSHARK ALOFT—First flight view of the big Douglas XA2D-1 Skyshark. The single-seat Navy carrier-borne attack bomber has an Allison T40 turboprop of approximately 5,500 hp. turning three-blade contraprops. Residual thrust exhausts from large port behind wing.

FURY CLOSEUP—Prototype North American XFJ-2 Fury (left) in Navy paint. Carrier version of USAF's F-86 Sabre, the FJ-2 has a GE J47 of over 5,800 lb. thrust, is armed with four 20-mm. cannon.

Military Planes In the News

SAVED BY SKIS—Lockheed F-80C (below) force-landed in Alaska, was saved by fitting temporary skis to permit takeoff and flight back to its base. USAF says this bit of ingenuity saved government $180,000.

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WHO'S WHERE

In the Front Office

Robert McCulloch has been re-elected president of Temco Aircraft Corp. (formerly called Texas Engineering & Manufacturing Co., Inc.), Dallas, Tex. Also renamed were **H. L. Howard**, executive vice president-treasurer; **John A. Maxwell, Jr.**, vice president-manufacturing; **Clyde Williams**, vice president-controller; **Latham Leeds**, secretary. Howard was also re-elected president of Temco's subsidiary, Luscombe Airplane Corp., Dallas. McCulloch was renamed executive vice president-treasurer and Clyde Williams was again named secretary of Luscombe.

Maj. Gen. Edward M. Powers, USAF (ret.), vice president-engineering of Curtiss-Wright Corp., has been appointed general manager of Wright Aeronautical division, succeeding **T. B. Focke**, who resigned. Powers joined C-W in June, 1949, after retirement as Assistant Deputy Chief of Air Staff, Materiel.

Changes

John H. Spade has been named to the newly created post of purchasing manager of Hamilton Standard division, United Aircraft Corp., E. Hartford, Conn. His former position as divisional accountant is filled by **Herbert W. Bch. Robert A. Aspinwall** has been placed in the new post of assistant general manager of Sikorsky Aircraft division of UAC. **Paul W. Holt** replaces Aspinwall as divisional controller.

Lawrence C. Immel has been designated sales engineer in the Midwest area for Adel division of General Metals Corp. He formerly was with GE's Gas Turbine division and had been with Wright Aeronautical division.

Air Marshal Sir Ronald Ivelaw-Chapman has been appointed Air Officer Commanding-in-Chief, Home Command, RAF. **Air Vice-Marshal Francis J. Fressanges** has been designated Assistant Chief of Air Staff (Intelligence), RAF.

Hal Lee has been appointed public relations director for Brazilian International Airlines, Aerovias Brasil. Lee has been editor of the Pan American Magazine and Pan American Yearbook.

J. Byron Watschke has been appointed Northwest Airlines director of sales administration; **R. D. Watson** has been promoted to director of tariffs, schedules and market research; **R. R. Hewitt** has been designated manager of schedules and **J. A. Alrick** is manager of tariffs.

Robert C. Colver has been designated manager of Elbeco, Inc., Aeroquip Corp.'s Jackson, Mich., subsidiary. Colver joined Aeroquip in 1949 as sales engineer.

Robert C. Perry has been named assistant to the president of Resort Airlines and will also act as the carrier's Washington, D. C., representative.

James M. Gillespie has returned to AiResearch Manufacturing Co.'s export department. For the past year he has been engaged by the Garrett Corp. as consultant on AiResearch equipment.

INDUSTRY OBSERVER

► Fairchild's new big-wing C-119H (AVIATION WEEK July 30, 1951, p. 17) is due to make its first flight at Hagerstown, Md., early in May. Meanwhile, Fairchild development on the XC-120 detachable pack version of the Packet continues; one new version of the detachable pack will be roadable with a tractor-trailer hitch for further ground mobility.

► **Navy heads tell Congress that the attrition rate on Navy aircraft runs between 1% and 2% a month and hasn't varied appreciably as a result of Korean combat operations. Lightness of combat losses is attributed to lack of enemy air opposition in the close support and interdiction missions flown. Meanwhile, USAF Sabre F-86s are warding off the Russian-built MiG-15s from the slower Navy planes as well as from the slower USAF fighter-bombers. Navy does not yet have operational in Korea a plane which will match the MiG-15 performance, but testified it will have in production this and next year about seven models that are "superior."**

► Air Force will modernize all T-7, T-11 and C-45 aircraft in the Air Force inventory to a C-45G configuration. This modernization comprises a new wing center-section, new landing gear, extension of engine nacelles, realignment of the tail assembly, new cockpit and cabin configuration and new communications equipment.

► **Air Force is ordering approximately 4,300 drogue parachutes from Pioneer Parachute Co., Manchester, Conn., at a total contract cost of $6,168,000. The chutes, which cost $1,426.39 each, are used to brake the Boeing B-47 landing run. Air Force figures the life of each parachute at providing 15 landings. This means it costs about $100 per landing to bring the B-47 to a halt on present runways. In the first seven and one-half months of fiscal 1952, B-47s made 2,500 landings, AF estimates.**

► Air Force is ordering a substantial number of Convair T-29E trainers for training K-1 system bombardiers. The E version will be equipped with Allison T38 turboprop engines.

► **In a reversal of Royal Air Force policy, quantity orders will be placed for either or both of Britain's new all-weather fighters, the delta-wing Gloster GA-5 and the twin-boom de Havilland 110. RAF had ordered only six of each for prolonged comparison trials. Speculation is that DH has the inside track for orders because of the more conventional overall design of the 110.**

► Air Force has ordered 14,855 General Electric J47-GE-25 engines out of fiscal 1952 funds for installation and spares for the Boeing B-47B six-jet bomber. Spares are currently figured at 200% per plane and are scheduled to be reduced to 150% yearly average by end of fiscal 1953.

► **Navy estimates that all three of its fleet carrier types—Essex, Midway, and the forthcoming Forrestal—will have nearly the same top sustained speed, about 32 knots. Although the Forrestal will have a 60,000-ton displacement as compared to 45,000 tons for the Midway, the new carrier flight deck will be only 65 ft. longer, with an overall length of 1,033 ft.**

► Possible hint of a future development at Republic Aviation Corp.: President Mundy Peale has on his desk a model of a two-place F-84 labeled "TF-84." Both military and industry observers many times have commented on the fact that the U. S. has only one jet trainer, the T-33, which also was developed from a jet fighter, the Lockheed F-80.

► **Vickers Valiant II, second prototype of the Royal Air Force's Avon-powered four-jet bomber which is slated for early flight, will differ from first prototype which crashed last fall. Major difference is said to be in wing design. Tipoff that the changes may be fairly sweeping is the fact that Vickers is cautioning publications not to use photos of the Valiant I to illustrate stories on the Valiant II.**

Washington Roundup

Aircraft Money Outlook

Congressional sentiment to "cut everything," including funds for plane purchasing, is snowballing—as evidenced by House Appropriations Committee's $910-million slash in proposed 1953 fiscal year funds for aircraft and related procurement.

But other factors indicate that it may be checked before long and that in final action Congress may approve approximately the $16,645 million recommended by the Administration for aircraft and related procurement for the year which starts July 1:

• **Senate Appropriations Committee** is heavily weighted with air-minded members. Under the leadership of Sen. Joseph O'Mahoney, chairman of the Armed Services Subcommittee, the committee last year voted $5 billion more for air power than asked by the Administration.

• **Senate Preparedness Committee,** apprehensive over lack of U. S. air strength, has consistently criticized the Administration for not pushing the air power program and now is gathering extensive data to buttress its position.

• **Sen. Harry Byrd,** chairman of the Committee on Reduction of Federal Expenditures and a past master at penny-pinching, won't go along with a major slash in aircraft procurement funds. The "Byrd budget," cutting funds for Defense Department from the $50 billion proposed in the Administration budget to $47 billion, still allows almost the same amount for plane purchasing: $12,675 million for USAF, compared with the $12,685 million proposed in the President's budget; $3,956 million for Naval Air, compared with $3,960 million.

• **Supporters of Gen. Dwight Eisenhower** for President are ready to fight for a strong air power program.

However, moves to speed up the Administration's air power program—which both the Johnson Committee and the Lodge camp urge—aren't likely to get far.

Defense leaders are going along with the Administration's stretchout.

Eisenhower's Report

Supreme Commander Allied Powers in Europe Gen. Dwight Eisenhower reports:

• **A year ago,** "less than 15 NATO divisions adequately trained and equipped for war," supported by fewer than 1,000 operational aircraft, "many of obsolescent types," were poised against 175 Soviet line divisions supported by 20,000 aircraft, 4,000 of them jets.

• **By the end of 1952** there will be 50 Allied divisions supported by 4,000 operational aircraft, "a significant proportion of which will be modern jet fighters" under present programming.

His comment:

"Air power is the dominant factor in war today. It cannot win a war alone, but without it no war can be won. Our goal is to create air strength capable of answering immediately the onslaught of an aggressor and covering, at the same time, the mobilization of reserve forces. . . . There is still a long way to go in developing air strength in Western Europe."

B-52: Intercontinental Range?

Undersecretary for Air Roswell Gilpatric's report to Congress that tanker refueling will be required on the B-52 has irritated USAF military leaders who have represented it as successor to the B-36 as an intercontinental bomber.

USAF's official reply to Rep. John Taber's query whether Air Force had gone far enough to know what the B-52 will do: "The only way to tell is to get the aircraft and to fly it. That is the only completely reliable way to determine that a new aircraft will be acceptable."

Under Congressional Criticism

Ex-Secretary for Air Stuart Symington: For overruling the recommendations of two committees, composed of prominent men in research and development, that Arnold Engineering Development Center be operated by a nonprofit organization. He ruled it should be operated by a profit organization.

Steve Leo, who headed USAF public relations under Symington, became $20,000-a-year director of administration of Aro, Inc., which was organized by Sverdrup & Parcel to operate AEDC.

USAF's report on Symington's influence in channeling the business to Aro: "While the records of the Air Force contain no memorandum or directive from Secretary Symington concerning the award of an operating contract to a corporation to be formed by Sverdrup & Parcel, all available information indicates that this decision was made by Secretary Symington personally."

Lt. Gen. E. E. Partridge, commanding general, Air Research Development Command: For volunteering, without stated reasons, that Aro be given a $3-million budget and $90,000 fee for this year, instead of the $1.5-million budget and $25,000 fee recommended by Maj. Gen. F. O. Carroll, former commanding general at AEDC. Carroll maintained that the $25,000 fee, amounting to over a 16% return on Aro's $150,000 investment, would be a "very handsome profit."

Rep. Albert Gore's comment to Partridge: "Just wondered what caused you to overrule the commanding general of the project, why you would use your superior position to inflate the project, inflate the contract?"

Partridge removed Carroll from AEDC, ordered Carroll to report under him at ARDC, and a $95,000 fee to Aro was agreed to by the Air Force. Later Gen. Carroll was named director of the USAF Human Resources Institute, Maxwell AFB, Ala.

House Appropriations Committee has voted to ban USAF from making any payments to Aro after July.

Korea Airlift Phaseout

Phaseout of commercial airlift for Korea will be completed during the 1953 fiscal year, which starts July 1, according to present plans.

Phaseout cost is set at $6.4 million and will involve 215 flights and demilitarization of 60 aircraft after July 1.

Air Safety Reorganization

Senate Appropriations Committee still supports reorganization of Civil Aeronautics Administration's Office of Air Safety to decentralize operations, but is critical of the manner in which CAA Administrator Charles Horne has put it into operation and shuffled personnel.

Sen. Pat McCarran, chairman of the Appropriations Subcommittee with jurisdiction over CAA: "The plan is right. It is the modus operandi that has been wrong."

—Katherine Johnsen

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House Group Asks Slash in Plane Funds

- **Committee chairman sees no reduction in buying.**
- **But if cut upheld, AF may get 500 fewer planes.**

House Appropriations Committee last week proposed slicing $4.3 billion from the overall 1953 defense budget. This would whittle $560 million from USAF and $150 million from Navy funds allocated for purchase of aircraft and related equipment.

The committee slashed the proposed 1953 military budget from $50,921,022,770 to $46,680,384,270, representing a cut under 1952 appropriations of $10.1 billion and $4.3 billion under President Truman's 1953 budget message.

The budget estimates were to provide 7,431 Air Force planes and 2,776 aircraft for the Navy, the committee disclosed.

▶ **Fewer Planes**—Washington observers forecast that the proposed slashes, if enacted into the budget, would certainly mean a considerable reduction in the number of planes programmed, despite "wishful thinking" on the part of congressional spokesmen that the Defense Department will be able to improve its procurement techniques sufficiently to make up the difference.

It was pointed out that labor costs and materials are continuing to mount and that it was already doubtful whether the full program could be bought with the uncut budget.

Under the House committee budget proposal each of the military services would be cut more than a billion dollars—to the Air Force it means elimination of 500-700 aircraft from its 1953 program; to the Army virtual elimination of weapons and equipment for almost three divisions, and to the Navy a one-third reduction in its ship-building program, including cancellation of a second (60,000-ton) super-carrier and planned keel laying of a second atomic-powered sub.

Differential in aircraft procurement cutbacks would be determined by redetermination of types.

▶ **Air Force**—Despite a $1.5-billion budget slash, Air Force still is top-dog in the defense budget proposals with $12,125,044,000 marked for aircraft and related equipment procurement. This sum alone is equal to what either of the other two services would receive for their total 1953 expenditure.

Under House committee recommendations, Air Force would receive a total of $20,928,178,770 for fiscal 1953. Specifically, the House committee asks that Air Force be given $12,125,044,000 for aircraft and related equipment; $130 million for major procurement other than aircraft; $525 million for research and development (includes a clause which would expressly forbid payment of any part of these funds to Aro, Inc., for operation of the Arnold Engineering Development Center; see p. 18 this issue for further details and AVIATION WEEK Mar. 31, p. 12).

Other major items in the Air Force budget as proposed by the House committee include $3,789,817,000 for maintenance and operation of facilities and an additional $45,334,770 for acquisition and construction; $3,150 million for personnel requirements; approximately $26.2 million for reserve components; $106 million for the Air National Guard, and $30.8 million for special contingencies.

▶ **Navy**—House budget proposal would slash Navy funds to $12,815 million, representing a $1,006-million cut in Navy's original request. This would mean that Navy would receive $3,810 million for aircraft procurement—$150 million less than it had requested.

Navy ordnance was slashed by $147 million to total of $985.3 million, a cut which will seriously affect Navy's guided missile procurement program. In other than aircraft procurement, Navy suffered a bitter blow to its permanent forces when the committee cut the ship-build-

. . . And It's a Sweptwing War

As the House last week was debating the cuts in the Air Force and Navy budgets proposed by its Appropriations Committee, the following summary appeared in Air Force Magazine with an on-the-spot survey of the air war in Korea written by Robert B. Hotz. Mr. Hotz, now public relations director of Pratt & Whitney Aircraft, formerly was news and military editor of AVIATION WEEK *and a lieutenant colonel in the AAF. This three-way experience, the editors believe, makes his comments of more-than-ordinary significance.*

- Only a sweptwing plane can survive in MiG Alley's transonic war.
- For months to come, the F-86 will be the only United Nations plane capable of slugging it out with the MiG.
- Plane lack prevents our exploiting MiG Alley as a training ground.
- Meanwhile, Reds train hundred of pilots there in transonic war.
- Above 30,000 feet the MiG is the better flying machine, but the Sabre is the better fighting machine at any altitude.
- MiG cannon are more destructive than our .50s but fire too slowly.
- We need fast-firing cannon to keep up in the armament race.
- MiGs have succeeded in halting daylight B-29 operations, but Reds have demonstrated no night fighter capability.
- Reds have failed in their first bid for aerial supremacy, but indications are that they may soon try again—with better weapons which they now have.
- Our fight against overwhelming odds is encouraging but realistic evaluation allows little consolation for the future.

ing program by approximately one-third.

► **Army**—The House-proposed budget would allocate Army $12.5 billion. This is a cut of $1,680 million, including a $918 million slash in procurement and production funds. Army's almost negligible budget for aircraft—$36,107,000—will not be further trimmed, official Army sources said.

Army's aircraft budget, about one-half of its 1952 allocation and one-third its 1951 share, programs purchase of two fixed-wing and two helicopter types. These are the Beech L-23 Twin Bonanza and L-20 Beaver (Canadian-built); Sikorsky H-19 and Piasecki H-21.

► **Expansion**—Since outbreak of war in Korea, Congress has appropriated $109 billion for the Department of Defense. Since Korea, the United States has built up its armed forces from 1.5 to 3.5 million men. Air Force has expanded from 48 wings to slightly over 90 wings and the other services have grown proportionately.

Rep. George Mahon, in discussing his committee's proposed budget slash, declared that, although $109 billion had been appropriated for defense since fiscal 1950, $73 billion of those funds had not been expended. By June 30, 1952, unexpended funds will still total $57 billion.

This, Mahon said, has resulted in considerable confusion in the minds of Congress and the public. Many persons, he explained, could see no reason for appropriating almost $50 billion more for defense spending when Defense Department has spent so little of what it already has been given. But, Mahon said, that is not a true appraisal.

► **Money Pledged**—"The $57 billion which will be on hand June 30 is unspent money but not unused money. This money has been used as a legal basis upon which the Department of Defense has made contracts for airplanes, tanks, guided missiles and other items which cannot be delivered for two or three years after orders have been placed.

"Obligation of those funds has been approved by Congress for the express purposes for which they've been requested and budgeted and cannot be used for other purposes. The appropriation is nothing more, in a sense, than a scrap of paper which makes it possible for the Defense Department to order long lead-time items which we must have.

"We have previously provided for one super-carrier for the Navy," he added. "We were requested to provide $210 million in the present budget for a second super-carrier. . . . We struck this carrier from the bill, feeling that the construction of the second carrier should be postponed. . . . No naval fleet in the world challenges our own and the Navy is in a better state of readiness than either the Air Force or Army.

"I hope the reductions made by the committee will not result in retarding the aircraft program. The committee reduced by $560 million the budget estimate of $12,685,000,000 for the Air Force aircraft and related procurement."

The reduction of slightly more than half a billion, he explained, does not seem too drastic in view of funds already on hand for procurement of USAF aircraft.

Grumman Plant Bursting Seams

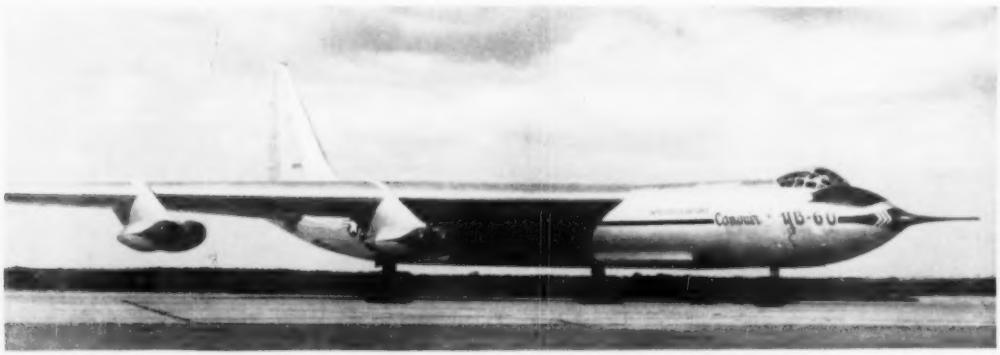
The familiar story of lower net income in spite of vastly increased sales is repeated in the case of Grumman Aircraft Engineering Corp., Bethpage, N. Y. In spite of a 64% climb in gross sales last year to $167,581,568, net income after taxes was down to $5,456,246 compared with 1950's $6,242,064 on gross sales of $102,312,498, Grumman reports.

Production-wise, Grumman apparently is bursting at the seams. During 1951 it stepped up subcontracting to approximately 50%, but still finds its present facilities are "inadequate" to meet projected 1952 schedules. Since little expansion is possible at Bethpage, increasingly hemmed in by real estate developments, the company is putting up a large assembly and production flight test facility about 40 mi. east to handle the load.

The load: backlog of over $90 million, not including letters of intent estimated at another $583 million.

To meet stepped-up military schedules, the company last year discontinued output of Mallard twin-engine amphibian executive transports, sharply curtailed its metal boats and canoe production.

► **On Schedule**—Although plagued by some delays in deliveries of engines and equipment, most schedules were closely maintained, and, in the case of one model, exceeded. Switchover from F9F-5 Panther to the sweptwing F9F-6 Cougar apparently went smoothly, with



PUBLIC GETS FIRST LOOK AT 8-JET YB-60

Air Force last week released this carefully posed photograph of the Consolidated Vultee 8-jet YB-60 recently rolled out of Convair's Ft. Worth plant in full view of the company's 32,000 employes and some 12,000 military and civilian employes across the big airfield at Carswell AFB. The picture showing the sweptwing design progression from B-36 to B-60 was taken at an angle which Air Force said would give the least amount of information to the Russians as to the plane's configuration. Pentagon reports say the landing gear system of the B-60 is the same as that of the B-36. The YB-60 uses the same fuselage as the B-36 with some modification to the nose section. Bombardier's windows have been eliminated in the nose and a needle nose, probably containing yaw-meter and electronic equipment, substituted. Wing of the YB-60 is the same in center section as in B-36 configuration, making it possible to adapt B-36 manufacturing tooling in those panels and landing gear. The YB-60 and the XB-52 aircraft are both powered by eight Pratt & Whitney J57 jet engines in their present form.

the latter in production approximately five months after initial flight.

Also being delivered are Albatross twin-engine amphibians to USAF, USN, and Coast Guard and the hunter-killer versions of the AF-2 anti-submarine type. "Satisfactory progress" is reported on the company missile program.

This year and 1953 will see Grumman hard at work on two high-priority Navy projects—its radical, big, XF10F-1 Jaguar carrier-borne transonic fighter with variable sweep wings, which has been ordered in substantial numbers before flight of the prototype; and the twin-engine XS2F-1, scheduled to be produced also by General Motors in Texas.

F9F-6 to Be Shown At SAE Air Review

First public appearance of the swept-wing Grumman Cougar F9F-6 will highlight the SAE Technical Air Review, concluding event of the Society of Automotive Engineers National Aeronautic Meeting which has been scheduled for Apr. 29.

The review—to be held at New York International Airport—will feature some 30 aircraft types and 13 powerplants. Military aircraft of all three services will be on display, in addition to personal, executive and transport types.

Tickets for admission—at $2.25 or a special student rate at $1.75—must be obtained through the SAE Meetings division, 29 West 39th St., N. Y. 18. Entrance will be by SAE-chartered bus only; private cars will not be admitted to the review area.

► **On Display**—Air Force planes will include: Boeing B-47, North American B-45, Northrop F-89B, Republic F-84E, North American F-86A and the Lockheed F-94B.

• **Navy** BuAer will make available: Grumman F9F-6, McDonnell F2H-2P, Douglas F3D, North American AJ-1, Martin P4M, Piasecki HUP-2 copter, Sikorsky HRS copter and Kaman 225 copter.

• **Army** will show: de Havilland L-20 Beaver, Cessna L-19 Bird Dog and the Beech L-23 Twin Bonanza, in addition to two helicopters—the Bell H-13 and the Sikorsky H-18.

• **Commercial craft** will include: Helio Aircraft's Helioplane, the Fulton Airphibian, Grumman triphibian, Martin 4-0-4, Douglas DC-6A, Aero Commander 520 and CAA, Piper and Bell crop-dusters.

• **Powerplants**: AiResearch auxiliary turbine, Allison T40, J35, J71 Boeing 502 auxiliary gas turbine, Fairchild J44, General Electric J47, Turbomeca jet engines, Westinghouse J34, Wright J65 and the Bristol Proteus.

Engineers Scarce in Top OAS Jobs

'Old Guard' holds reins in CAA's Office of Air Safety, with qualified engineers well down the ladder.

(Editor's note: This is the first of a series of articles analyzing CAA's Office of Aviation Safety, its policies and key personnel.)

By Alexander McSurely

Who makes CAA's engineering decisions for aviation safety?

If the big unwieldy federal aviation agency were organized like a well-run private business, there would be a separate engineering department, headed by a crackerjack aeronautical engineer at the Deputy Administrator level reporting directly to Administrator Charles F. Horne.

At least, that is what you would expect. But that isn't how it is.

Instead, the qualified engineers at CAA are well down the ladder.

► **In Top Jobs**—Not only do they not report directly to Administrator Charles Horne, but they are not even in the real policy-making jobs in the office where they are assigned.

Firmly entrenched in the top jobs of the CAA Office of Aviation Safety, like many other CAA offices, you find the "old guard." (In CAA talk the old guard means the old-time airplane pilots and factory inspectors, many of them without any aircraft industry experience, who have climbed to the choicest salaries in CAA. How did they climb? Through Civil Service seniority, poker-playing friendships and other reasons which will be discussed more thoroughly later, but not through engineering qualifications.)

► **The System**—Specifically it works out like this:

The two top officers of the Office of Aviation Safety, E. S. Hensley, Director, and William B. Davis, Deputy Director, have no technical qualifications other than as former pilots and inspectors. Their technical staff assistant post has been vacated in the recent re-organization. It will soon be filled by David L. Posner, a qualified engineer, who has heretofore been assigned in CAA's Powerplants Branch, as chief of the installation unit. But Hensley and Davis will make the decisions from the inspector's viewpoint, not the engineer's.

Down at the next level you get a little closer to the engineers, in the Aircraft Engineering division which, however, is currently headed by George W. Haldeman, a pilot. The Deputy Chief is Omer Welling, who had two years of college at Ohio State University, and some aviation industry experience at Hall, in Buffalo, and Fleetwings, before coming to CAA.

► **Top Engineers**—Reports say that Hensley and Davis are grooming Welling to move up to the top aircraft engineering spot to replace Haldeman, as soon as another spot for Haldeman can be found. And scheduled to move into Welling's deputy spot will be R. B. Maloy, now chief of flight test branch. Maloy, incidentally, is both an engineer and a pilot.

The best recognized qualified engineers in CAA's Washington office and the most respected in the aviation industry are: Steve H. Rolle, Chief of Powerplants Branch; A. A. Vollmecke, Chief of Airframe and Equipment Branch, and the former CAA Chief Engineer, Harold Hockstra, who has been sidetracked to a futures program at a time when the office needs solutions to its problems of today.

Hockstra formerly was equivalent to a Deputy Chief of Aircraft Engineering, on the same level with Welling, but held the title of chief engineer. About a year ago, however, he was assigned to a special job which is called Assistant Director for Prototype Aircraft Development.

With the present congressional trend toward cutting out any government sponsorship of prototype development, the value of this new post will obviously be up for review. Meanwhile, Hockstra's old job under Haldeman has been changed to a new job classification of project control officer and has been filled by another non-engineering employe.

CAA sources say that Hensley's reason for moving up Welling is because he and Maloy are backed by industry.

► **Clash With Industry**—However, industry sources say that Welling and Maloy do not enjoy unqualified support. And they point to serious clashes between the two men and industry engineers at the series of engineering conferences which have been conducted in Washington over a period of years.

There is, in fact, an industry trend toward depending on the Civil Aeronautics Board as a veto power for bad decisions by CAA, which in itself is a strong implied criticism of the CAA engineering status quo.

It is known that the Aircraft Industry Assn. recently thought it necessary to poll its member companies to see whether they wished an official position to be taken in regard to the CAA Office of Aviation Safety and its reorganization.

► **One Qualified**—A list supplied by CAA of chiefs of the aircraft engineering branches in the seven CAA regions shows that here too the pilots far out-

number the engineers. In fact, there is now only one chief of a regional aircraft engineering branch—W. H. Weeks, in the Kansas City Region 5—who is a qualified engineer as well as a pilot. The rest are pilots, not engineers.

There is cited in the Chicago region the case of a veteran qualified engineer, Roger Schlemmer, former chief engineer at Aeronca, who resigned from the Chicago region when a pilot, M. B. Hall, was named chief of the regional aircraft engineering branch. Hall had first been assigned as acting chief, and later the appointment was made permanent.

W. A. Klikoff, a Massachusetts Institute of Technology engineering graduate, has recently been named chief of the Aviation Safety division in the Los Angeles Region 6, moving him from his aircraft division chief assignment which he held previously. But he is a rare exception in the regional aviation safety setup of CAA.

(Watch for the second article in this series detailing how CAB has been forced to override CAA's safety decisions because of the logic of industry and pilot protests against the decisions.)

PAL Considers Convair 340s

Pioneer Air Lines, which recently purchased nine Martin 2-0-2s from Northwest Airlines for $4.2 million to replace its DC-3 fleet, reportedly is interested in buying five brand new Convair-Liner 340s for delivery in 1954.

PAL carried nearly 162,000 passengers over its 1,934 route miles in 1951, expects to fly 200,000 this year and thinks traffic by 1954 will require the additional planes.

Temco Aircraft Corp. (formerly Texas Engineering & Manufacturing Corp.), will start immediately reconditioning five 2-0-2s at Majors Field, Greenville, Tex. The other four aircraft are due shortly.

AF Continues Study Of Flying Saucers

Flying saucers, whether imaginary or real, whizzed across the public horizon again last week when Life Magazine delved into the subject of those mysterious objects with current comment by some of the nation's leading scientists.

Air Force, plagued by reports of flying saucers since 1947, has reluctantly admitted it is still correlating such reports.

As a result of public interest in 1947, AF set up a special office known as Project Flying Saucer to examine, evaluate and correlate flying saucer reports. Air Force officials said evaluation of occasional sightings is now made through regular AF intelligence channels.

RAF vs. MiG

- **Red plane no real threat to British, Britain says.**
- **For, after all, MiG was built from British ideas.**

By Nat McKitterick
(McGraw-Hill World News)

London—Has the MiG-15 really lessened the West's ability to deliver the atom bomb to an enemy heartland?

You won't find many officers of the Royal Air Force who think so. The question on this side of the Atlantic is not so much "Will the atom bombers get through?" as "Will our fighters be able to intercept enemy atom bombers of the future?"

This smugness is no reflection on the MiG-15. "After all," the British say, "these aircraft are primarily built from British ideas." At the same time it is obvious that the RAF thinks it will take a lot more than the MiG-15 to knock out the striking force of bombers that RAF Bomber Command is now collecting.

▶ **British Philosophy**—Ever since 1946 the RAF has been carrying out a bomber program with a minimum of fanfare and a maximum of security, which shows a philosophy a good bit different from that of USAF Strategic Air Command. This program already has born fruit in the English Electric Canberra and the Vickers Valiant four-jet medium bomber. And if all goes well, the public will get a peep at the most dramatic development so far when the A. V. Roe, Ltd. delta-wing "sonic" bomber flies for the first time this summer.

Compared to the B-36, the B-50 and even the B-47 these are medium and light bombers with a very different mission. Air Chief Marshall Sir Hugh Lloyd, chief of RAF Bomber Command, sums it up, "Bomber Command is a rapier, not a bludgeon." Sir Hugh doesn't put his thoughts into words, but there is no great difficulty in seeing what he means.

The RAF's idea of strategic bombing is a single or small group of ultra-high altitude, sonic and sub-sonic bombers armed with atom bombs and able to pinpoint their bomb loads on carefully selected targets from heights of 60,000 ft. or more.

▶ **Korea Not World War III**—This is not just a theory of arm-chair airmen in the Air Ministry. British pilots have been flying with USAF in Korea. Reports have been studied minutely to find cause to alter the course of Bomber Command development. While RAF frankly does not believe Korea is the place to judge the future, where condi-

T-33 DISPLAYS ITS FORM

Unusual photo shows Lockheed T-33 jet trainer in two views simultaneously, side and plan. This popular two-place development of the F-80 fighter is being built for USAF, USN and USMC, is also going to six foreign countries. Planes shown differ from earlier T-33s in having larger, finned tip tanks and cleaner canopy minus former bracing member between the cockpits. Tip tank of photographer's T-33 is in the foreground.

tions would be applicable in a third World War, RAF feels its program has been justified.

Nor is the future Bomber Command a matter of drawings and statistical curves only. The British claim that both the Canberra and the Valiant (the latter of which is referred to as an "interim" type) have speed and maneuverability about equal to the best fighters in service anywhere in the world right now. RAF believes mock combats between the Canberra and the F-86 and the F-84E have borne this out.

At between 45,000 and 50,000 ft. the British light bomber outmaneuvered all the fighters that could get that high to have a look. Even at 35,000 ft., the British say, the Canberra has the legs of both the Sabre and the Thunderjet. In one mock combat with an F-84E, the Canberra turned the tables and began to turn inside and outfly the amazed fighter pilot.

It can be confidently predicted that the two newest British bombers, whose prototypes are now nearing completion, will be even more impressive. The Avro delta-wing bomber, in anticipation of which the Avro 707A and 707B test deltas were built, will probably have a cruising altitude near 60,000 ft. and carry its bomb load over the target at around 700 mph.

The Handley Page crescent-wing bomber, whose wing was being tested on a conventional fighter fuselage in the test craft, H.P. 88, which crashed last summer, should be in the same class. The British figure that fighters—even those with GCI—will have to fly considerably up into the supersonic range to intercept bombers of this type.

▶ **New Bomb System**—Dropping bombs with great accuracy from 60,000 ft. means, of course, revolutionary changes in aiming devices. Two Canberras, equipped with the latest British sights, are out on Australia's Woomera rocket range for testing now.

But the presence of the Canberras in Australia may point to more radical developments in bomb launching from the air. Britain's guided missile program has gone on hand-in-hand with bomber development, which gives a clue to the purpose of the new bomber fleet.

RAF sees the bomber of the future as an "airborne aimer" for radar controlled missiles.

There will be very few of these new bomber types for the RAF. They are enormously complex and therefore prohibitively expensive. Mass production of such aircraft would break countries with far stronger economies than the ailing British. Consequently, all emphasis is on quality at the expense of quantity.

The heavy bomber, RAF believes, has had its day; the medium and light bomber is now supreme. Based "strategically" (including carrier borne, no doubt) around the world, the "sonic" ultra-high altitude bomber, depending on speed and maneuverability for its defense, is the answer for the future.

▶ **British Confident**—One could argue that Britain's dire economic plight mothered this theory. To remain a first-line air power today, the British had to find a way around the huge material and manpower demands that go with a mass air force.

But the air of confidence around Bomber Command indicates that it would be very foolish indeed to shrug off the new British bombers as creatures of economic expediency. One group that certainly doesn't is the top brass of RAF Fighter Command. So far, the British have no fighter answer if the Russians came up with quality bombers equal to those Bomber Command is getting.

Martin Finance

- **Stockholders authorize doubling common stock.**
- **Glenn L. Martin may be honorary chairman.**

A final "closing" session for all parties in the refinancing program for Glenn L. Martin Co. was planned last week following approval by stockholders of a proposal to double authorized common stock to a total of 3 million shares to get new capital.

Martin stockholders also have okayed a plan to issue $6 million in 4% notes to those having stock conversion and voting rights.

Conversion will be to common stock seven months after notes are issued, at $6 a share.

Indication that Glenn L. Martin, founder and for many years head of the aircraft company, is stepping further out of active management is seen in the authorization voted by stockholders to the Martin board to elect an honorary chairman. He will not be an officer of the company. This is presumably an "emeritus" job for Martin, who has been board chairman.

▶ **New Shares**—It was announced at the stockholders meeting that the board of directors probably will authorize a subscription offering of approximately 1 million common shares to stockholders as soon as the details are worked out.

A report to stockholders on the refinancing plan, laid out details of management compensation:

• **George M. Bunker,** who was elected president and chief executive officer of the company on Feb. 21, will receive $75,000 a year and will be granted an option to purchase 75,000 shares of common stock.

• **J. Bradford Wharton, Jr.,** vice president, elected at the same time as Bunker, will receive $45,000 a year, with option to buy 25,000 shares.

For the year 1951, the following remuneration was paid:

• **Glenn L. Martin,** chairman, $60,260 in salary and fees, with an additional $14,779 paid by the company under employes' pension plan.

• **Chester C. Pearson,** president and general manager (resigned Feb. 21, 1952), $60,260 salaries and fees.

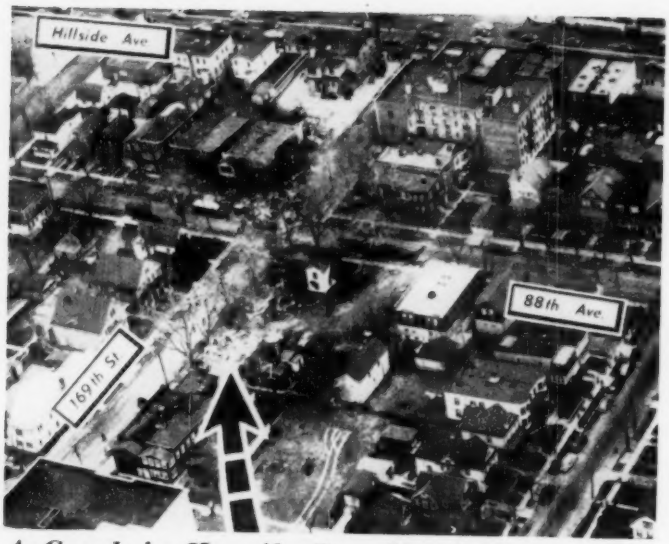
• **George T. Willey,** vice president-manufacturing and assistant general manager, $37,262 salary and fees and $5,364 additional paid by company into pension fund.

In 1951, officers and directors received a total of $266,950 in salaries and fees plus payment of $24,420 in their behalf into the pension fund. This does not include $93,850 paid for legal services to Jones, Day, Cockley & Reavis.

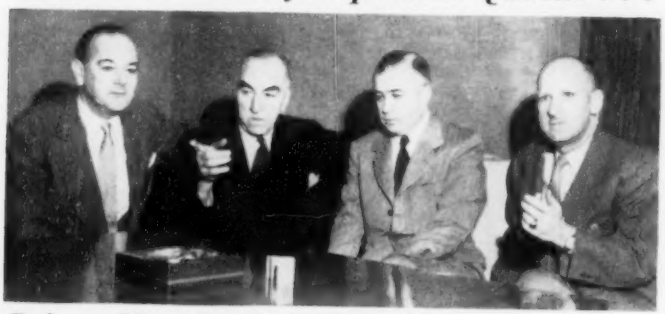
▶ **No Other Changes**—A spokesman for the Martin Company said that no other changes in executive management had been announced last week. However, it was stated in the stock option plan that no options would be granted to other officers or personnel to participate in the plan for several months, or until the new management has had an opportunity to appraise key personnel.

As previously reported, the total Martin refinancing plan calls for: increasing the Martin Co. V-loan credit agreement to $27.5 million, increasing RFC loans to a total of $12 million withdrawal of an arrangement under which the banks participating in the credit agreement would receive an amount equal to 30% of the proceeds of future sale of Martin 2-0-2A planes now under lease; modification of contracts with Eastern Air Lines and TWA to provide a price increase of $25,000 a plane on 101 Martin 4-0-4 transports now being delivered, or a total of $2,525,000; release by TWA of options to buy additional planes, engines and propellers; securing of at least $6 million in additional junior capital, which will be handled through 4% convertible notes.

Interests in the proposed financing program are shown as the Mellon National Bank and Trust Co., Pittsburgh, which is a party to the credit agreement and the V-loan agreement, and the Baltimore National Bank, which has a 2% participation in loans covered by these agreements. The Baltimore bank also will act as trustee for the proposed notes, warrant agent and agent of the voting trustees for the notes. Representing the two banks on the Martin board are Everett H. Pixley for Mellon and Howard Bruce for the Baltimore bank.



A Crash in Heavily Populated Queens . . .



Brings New Problems for Safety Group

Public outcry in the New York metropolitan area against airports located near residential sites had begun to die out. The Port of New York Authority, with approval of cities adjoining Newark Airport, had agreed to re-open that field for limited military use.

Two days later, early on a lowering, rain-swept Saturday morning, a C-46 cargo plane owned by U. S. Airlines missed an approach to Idlewild Airport and plunged into the heart of the Borough of Queens, narrowly missing large apartment buildings (top photo), and killing the two-man crew and three persons on the ground. It was the fourth crash into residential sections of the New York area since December.

▶**Demand Closing Fields**—Immediate reaction was renewed demands to keep Newark shut tightly and, in the bargain, close down both Idlewild and La-Guardia Field. The crash, plus public reaction, brought a hurried special session of the National Air Transport Coordinating Committee of Capt. E. V. Rickenbacker (shown, pointing, in the lower photo with American Airlines' C. R. Smith, left, Port Authority's executive director Austin Tobin and Air Line Pilots Assn.'s A. F. Foster). After the meeting, Rickenbacker said everyone concerned was cooperating "to determine the essential facts as rapidly as possible."

The facts of the crash itself were fairly routine. The plane inbound from Florida was making an instrument approach over Jamaica Bay, south of the field. Tower gave Pilot William Crockett, Jr., reported weather of 10 minutes previous—ceiling 500 ft., visibility one to one and one-half miles. The pilot reported at 3,500 ft. and asked for a straight-in approach to Idlewild.

▶**Missed Approach**—He was cleared for immediate straight-in approach and instructed to report at 2,500 ft., which he did. He was told to fly over Runway 4, the instrument runway, and make a left turn to land on 13L, the runway into the wind. He was instructed to report visual contact over the range station, which he did.

On his approach, the precision approach radar tracked him as coming in on course at 500 ft. He was told to make his turn to land on 13L. He missed his approach, was ordered to make a right turn and pull up to 1,500 ft. over the ocean and await clearance for another pass. He was seen to head north of the airport at about 500 ft.

The plane crashed two miles north of the field.

P&WA Confirms Ford J57 License

Pratt & Whitney Aircraft last week confirmed an earlier USAF announcement (AVIATION WEEK Feb. 4, p. 15) that a licensing agreement is being negotiated for Ford Motor Co. to build the new Pratt & Whitney-designed J57 jet engine at the Chicago Ford Aircraft Engine division plant.

Ford already has started to make J57 components at its Dearborn plant for Pratt & Whitney's earlier J57 commitments. The Ford license is called the result of increased military demand for the axial-flow twin-compressor jet engine, which has been unofficially rated at around 10,000 lbs. thrust.

It already has been designated as powerplant for the two competitive eight-jet bombers, Boeing XB-52 and Convair YB-60.

The J57 also is unofficially reported to be the powerplant assigned to the North American F-100 advanced Sabre, and to the Convair XF-102 delta-wing missile-carrying interceptor. There is speculation it also will go into the forthcoming four-jet version of the Boeing B-47 medium bomber, after the prototype, which will employ Allison J71 engines.

AEDC Delays Worry House Committee

House Appropriations Committee has taken an interest in the lag in development of facilities at the Arnold Engineering Development Center at Tullahoma, Tenn.

Air Force says it urgently needs the facilities for testing planes already in production and the committee is trying to find the causes of delay:

- High-altitude engine test chamber won't be operational until May 15, 1953. A year ago, it was scheduled for completion this month.
- Supersonic propulsion windtunnel won't be operational until early 1957. A year ago, it was due for completion by early 1954.

VISIBILITY

by Swedlow

in the F-86 Sabre Jet

Smashing victories over Red MIG-15 jets have marked the performance of America's top line North American Aviation F-86 Sabre jet fighters in combat service with the Air Force over Korea.

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Three plants in California and the centrally located plant in Ohio are now at the service of the aircraft industry with duplicated facilities and tooling as a precautionary measure for any emergency

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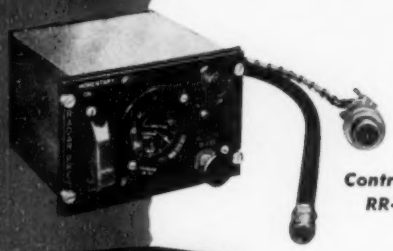
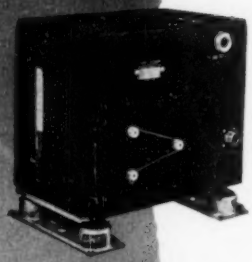
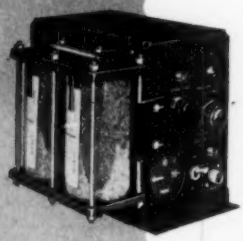


Control Panel RR-9580



Pressurizing Kit RR-9470



Pressurizing Kit RR-9500B

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GE Cuts Bottlenecks at New Jet Center

- **Lockland works on new ideas and new techniques.**
- **Next decade may exceed 'fastest' one just past.**

By David A. Anderton

Lockland, Ohio—Born ten years ago of war's necessity, General Electric's aircraft gas turbine business is now a healthy stripling, feeding heartily on the demands of current emergency.

And judging on today's strength and tomorrow's promised growth, the next decade should see a business of powerful maturity.

Like any proud parent, GE showed off the prodigy on its tenth birthday and bragged a little about abilities and accomplishment. To help celebrate the occasion, GE invited industry, the military, and the aviation press.

▶ **Jet Center, USA**—When GE's new jet center is completed, there will be just about 4 million sq. ft. of factory, office and administration space. Lockland will become one of the largest jet engine areas in the world, and from its sidings will move trainloads of the cylindrical steel cans which house the J47 and will carry the J73 and later engines.

From Lockland will flow the orders to more than 4,000 suppliers and subcontractors who backstop GE's jet program. Almost 80% of the engine work is subcontracted; about 60 cents out of every dollar GE receives goes directly out again to suppliers.

▶ **Past History**—It was on Mar. 18, 1942, that the first GE-built jet engine made its initial test run. Based largely on a sample Whittle engine received from England six months before, the GE gas turbine was designated the Type I-A and rated at about 1,300-lb. thrust. It weighed less than 800 lb., complete with accessories. It had a centrifugal compressor with a double inlet, and a single-stage turbine. Specific fuel consumption was 1.35 lb./hr./lb. thrust.

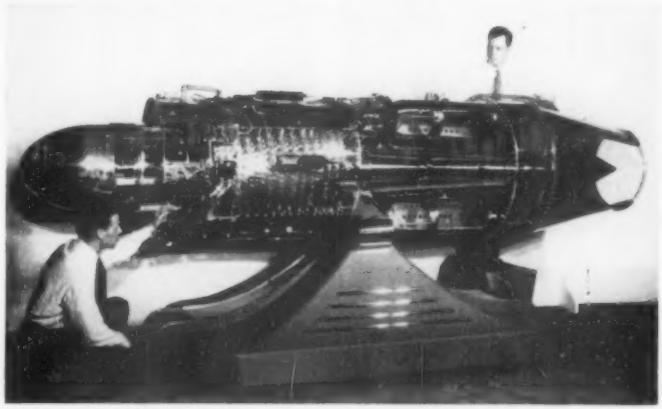
The J47-GE-27, shown publicly for the first time at the birthday celebration, produces "over 5,800 lb." of thrust and weighs close to 2,500 lb. Specific fuel consumption is probably better than 1.03 lb./hr./lb.

The Type I-A flew for the first time on Oct. 2, 1942, in the two powerplants of the Bell XP-59A Airacomet, first jet aircraft produced in the U. S.

(The United States was the third nation in the chronology of jet flight. The first was Germany, where a Heinkel 178 first flew Aug. 27, 1939. The British flew the Gloster E.28/39 on May 15, 1941.)

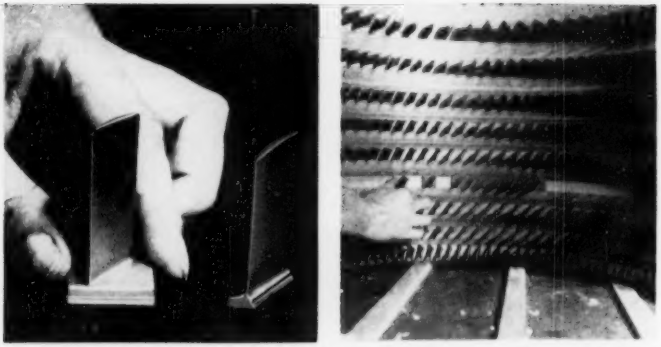
The I-A was hardly through its initial proving runs when GE engineers began studies of the I-14 (so-called because it was to be rated at 1,400-lb. thrust). This was followed rapidly by the I-16, I-18 (which was a development engine only) and the I-20. All these engines went through test runs within two years of the first run on the Type I-A.

▶ **New Designs**—These were all developmental engines, based on British ideas and in some cases, merely copied from them. But the GE people felt that they could make original contributions to jet engine programs, and early in 1943 began the design of two new engines. Both were to be rated at 4,000-lb. thrust, a big jump from the 2,000 lb. of the I-20. One engine, bearing the company designation of I-40, was to

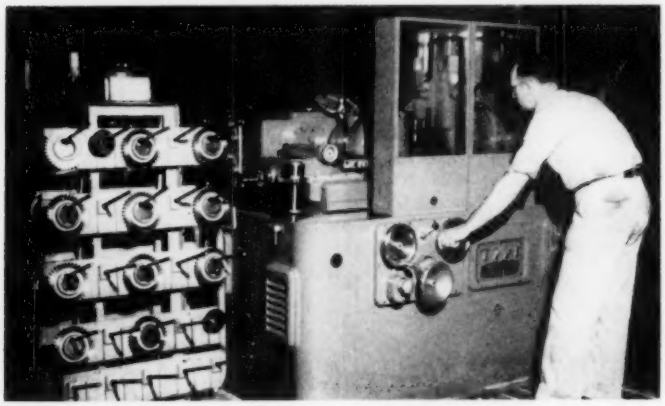


BASIC J47 TURBOJET, shown here in cutaway, is the foundation for a whole family of engines. Several versions of the J47 are in high production at GE.

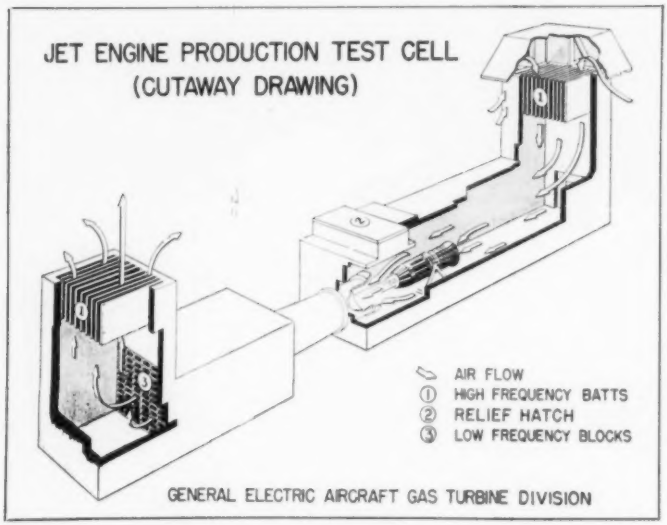
NOISE-FREE floating control room is one of the features of the Lockland jet center.



BLADE FORGING BOTTLENECK is attacked by GE with new method of fabricating compressor stator blades. New unit (first blade in left photo) is compared with old forged blade. New blade has been welded into base. It then is slipped into slotted casing (right).



PRECISION GRINDING of J47 gears is done on this Swiss Reishauer machine.



use a centrifugal compressor; the other, called the TG-180, was to use an axial compressor. In later days, these designations were to be changed, the I-40 became the J33 and the TG-180 became the J35.

First flight of the J33 was in a Lockheed XP-80A; it took off on June 10, 1944. The J35 was flown two years later in the first prototype Republic XP-84 Thunderjet. Both engines were accepted for production by the Air Force.

At war's end, production responsibility for these two engines went to the Allison division of General Motors Corp. In considerably improved variants, they are still in high production at Allison.

► **Basic Engine**—Shortly after the war, another engine went into development at GE; it was the J47, destined to become the foundation engine for a whole line of turbojets. The J47's maiden flight came in 1948, with the first test hop of the North American XP-86 Sabre. From this experimental installation in a new fighter, the J47 has gone on to power the later Sabres in all the F-86 modifications.

It also is the powerplant for the Boeing B-47 and the North American B-45 bomber variants, the Republic XF-91 interceptor and the Martin XB-51 light bomber. Four of these engines are podded in the Convair B-36 bombers for extra power above that of the six piston engines.

Currently in production in a hatful of versions, the J47 is being built at GE's Lynn, Mass., and Lockland plants, and is to be made under license by the Studebaker Corp. and the Packard Motor Car. Co.

Thrust rating of all the J47 models is given cryptically as "over 5,200 lb.," which is sea level static thrust. Basic frame length of the engines is 144 in. (less any afterburner), and diameter is about 36 in. Total weight with accessories varies from 2,500 lb. to about 3,000 lb., depending on the engine model. Specific fuel consumption is given for one engine (and is probably typical of the lot) as 1.03 lb./hr./lb.

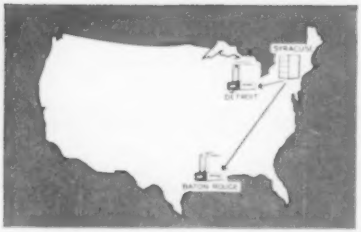
► **New Model**—Latest version of the basic J47 engine, the −27, was revealed for the first time during the tenth anniversary celebration (AVIATION WEEK Mar. 31, 1952, p. 18).

The −27 is slated for installation in North American's new F-86F Sabre and FJ-2 Fury, scheduled for side-by-side production at the Columbus, Ohio, plant of NAA.

Only information on thrust rating of the new engine is that it puts out about 10% more thrust than the J47 powering the Sabres in Korea. (The J47 now in combat use is the −13, one of the "over 5,200 lb." engines.)

New features of the −27 are in the

Extra protection. Autopositive reproductions are used in place of those drawings which would otherwise be exposed to constant wear and tear. These intermediates – with dense photographic black lines on a durable, white paper base – produce sharp blueprints whenever needed.



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auxiliary systems. High-altitude starts have been improved by the use of a higher-energy d.c. ignition system using opposite polarity, enlarged cross-fire tubes (which carry the combustion process from chamber to chamber after ignition in one of them) and revised fuel regulator control to get the very low fuel rates required at altitude. GE spokesman said that altitude starts can now be made up to 40,000 ft.

Thermal anti-icing, using hot air bled from the compressor, is also a feature of the −27. And inlet screens have been incorporated on this engine.

Aerodynamic change in the basic compressor design made the first-stage blades longer for increased air handling and an increase in compressor pressure ratio. Coupled with this has been some improvement in the specific fuel consumption.

The −27 is now in production at GE's Lynn, Mass., plant, and will go into production at Lockland shortly. It is one of the company's high-production program engines.

► **Plant Tour**—A walk through the relative quiet of the Lockland production area is impressive. Right now, there are lots of new machines, some still on break-in runs.

There is also a lot of open and nonproductive space. That's to be expected, because Lockland is still understrength. The entire layout has been planned for high production; now, tooling is still underway. The 7,500 employes currently in the factory will soon number 12,000.

Typical of the specialized tools required for the complex processes of turbojet manufacture is the Allen drill. This machine has 16 work stations and 15 working heads. It drills, spotfaces, countersinks, counterbores and taps all the holes on the J47 front compressor frame. The frame is set up on a traveling bed and moved (now by hand, later automatically) under each of the succession of heads. According to GE, the operation takes one-eighth the time for equivalent work done on radial drills.

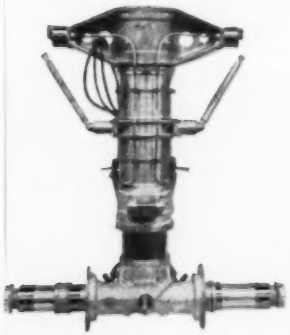
► **Fabricated Blades**—GE is avoiding the blade forging bottleneck by designing compressor stator blades for fabrication. Process was developed at the company's Thomson lab at the Lynn works and represents a reversion to steam-turbine practice.

In the new process, stator blades are rolled in long strips, contoured to proper section and then cut to length. Blade base, previously dove-tailed to fit into a ring, has been redesigned. Now it has an opening for blade insertion and welding, and in addition, the base has been expanded so that it now functions as the stator ring as well as blade base.

This method of fabrication has been

(Continued on p. 29)

CLEVELAND PNEUMATIC - *pioneers and leaders in Aircraft Landing Gear*



This is the aft landing gear for the Boeing B-47

This "indoor landing field" insures top performance in landing gear

Cleveland Pneumatic engineers use this "Spin-Up" Drop Test equipment to simulate closely actual aircraft landings. With wheels rotating at high speed, the gear is dropped to produce the impact and strains encountered when airplanes touch the ground. By such special tests, the engineers can verify their calculations on new gear designs and often further refine them.

This test is only a part of Cleveland Pneumatic's complete laboratory facilities, which also include the finest in metallurgical control.

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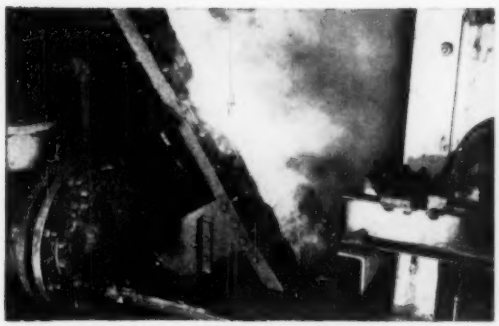
HOW TO GET THE MOST OUT OF THE 18,000,000

Here are the actual test results on a typical production run at Hubbard & Company. At left is the finished washer ready for delivery. Middle picture shows the washer after the 90° twist test required by specifications. As shown at the right, Hubbard spring washers will consistently withstand a twist test far greater than required.



At Hubbard, this variable speed conveyor removes spring washers from the quench tank on a precise time cycle. Here, the washers enter a low temperature rotary furnace.

This rotary furnace removes the oil and assures desired temperature control prior to batch tempering.

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You could hardly find worse service conditions. Temperatures often vary 50, 60, even 70 degrees in a single day. And, because they are part of the rail joint, these washers must cushion the wheel load shock of trains that every day become longer, heavier and faster.

Some time ago, our metallurgists got together with Hubbard engineers and came up with a vastly improved method of heat treating these alloy steel washers. This heat treating system has achieved uniform heating, precisely timed quenching and fool proof tempering. Result: a higher quality product, more uniform than ever before.

HERE'S THE COMPLETE STORY:

"Failure reports have stopped"

says B. J. McTighe, Superintendent, Tool Division, Hubbard & Company

"Since installing our new heat treating system, we've sold about 18,000,000 spring washers without one reported failure. The improved heat treatment, suggested by United States Steel, has resulted in more uniform structure, better mechanical properties and a retention of spring properties under all conditions. We can meet specifications even if alloy steel restrictions become more rigid in the future.

"These spiral spring washers, made from CARILLOY 9260 steel, are hardened to an average of 49/52 Rockwell C. Despite this high hardness, the washers easily meet the specification requiring a 90° cold twist in the fully heat treated condition. Our own shop control limits are even more severe than this to make sure that we meet and exceed railroad standards.

"These washers have exceptionally high and uniform reaction values. After they are compressed, these washers return to their original contour while retaining their spring properties. We think the superior performance is due to our improved heat treating system."

If you're having trouble handling lean alloys, we may be able to suggest heat treatment methods that will give you more uniform hardness, less rejects and less retreatments. Simply call or write our nearest district sales office.

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UNITED STATES STEEL

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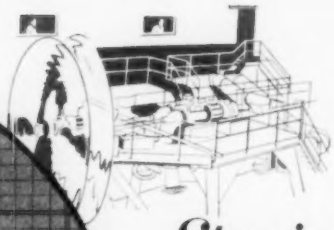
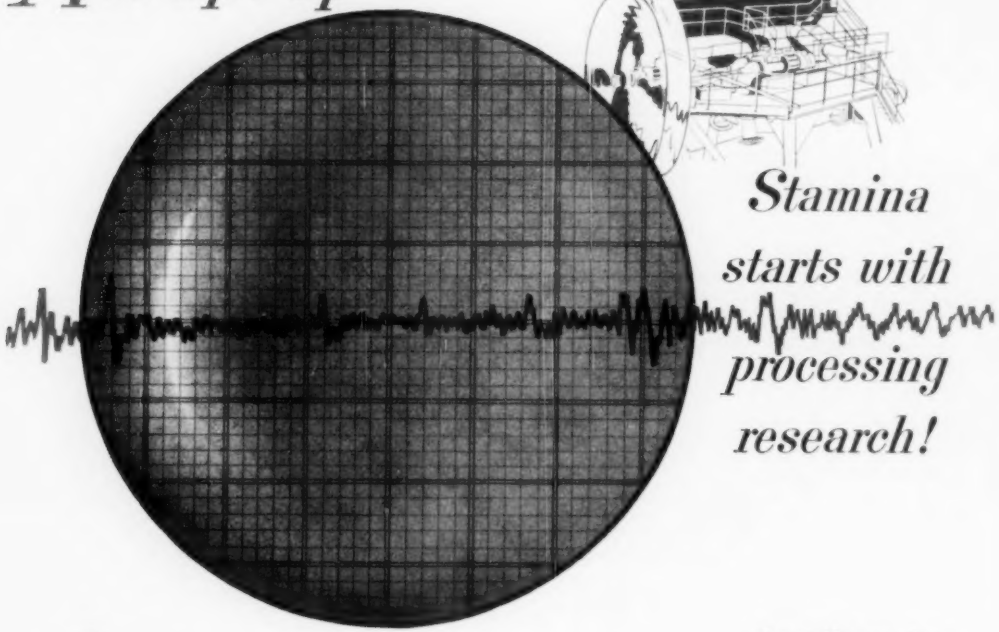
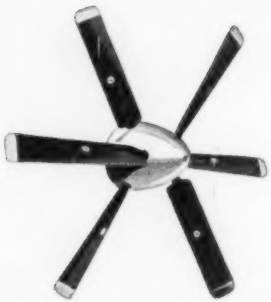




Stamina starts with processing research!



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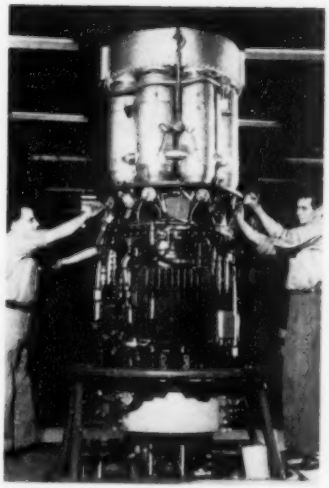


NOSE DOWN. J47 goes down green line.

(Continued from p. 24)

approved for the more than 1,000 stator blades in the J47 compressor; rotor blades, which are loaded heavily by centrifugal force, will continue to be forged for the present.

▶ **Pneumatic Contour Gage**—Another time-saver is the Sheffield Precisionaire, a pneumatic gaging device for blade contour. Previous practice in the jet engine business has been to use a series of guillotine gages to check each blade. This is laborious; an inspection rate of one blade per minute was quoted by GE for the task.

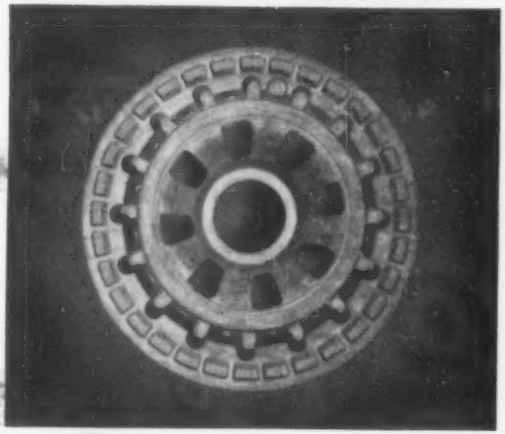
With the Sheffield device, an operator can inspect ten blades each minute. Each blade is clamped in a holding fixture and a foot pedal raises a series of feeler gages against the blade surface. The operator looks at an indicator chart—a series of glass tubes against a white background—with two horizontal lines marking limits for upper and lower blade contour tolerances. A number of little bobbins are suspended in the glass tubes and are free to rise and fall under air pressure variations. When all the bobbins lie between the limit lines, the blade is acceptable.

▶ **Line Methods**—GE's current assembly practice is to run engines through a "green" assembly, test them, tear them down, inspect, and reassemble on the final line. After final assembly they are again run and shipped.

The engines are assembled vertically on the green line; fixtures are designed to stand the engine on its nose. Major reason is to eliminate the small sag in the long frame resulting from horizontal assembly. Secondary advantages are space-saving and accessibility.

The reason for staying with the horizontal assembly on final line was ex-

Right kind of a let down



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These Well-Cast wheels and the wide range of other light metal aircraft castings have the facilities of four plants, technically trained personnel, and almost a half-century of experience behind them.

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Remote Operator Control Panel

Combination Wind Cone and Wind Tee

CROUSE-HINDS

WIND TEES

Landing Direction

DAY and NIGHT

Crouse-Hinds Wind Tee serves as a continuous day and night indication of wind direction or preferred landing direction. It can be furnished either as a simple wind tee responsive to the wind only, or with accessories which make it completely automatic or controlled by a remote operator.

The wind tee gives the appearance of a single green "T" when viewed from above at night and a single stroke yellow "T" when viewed from above in the daytime.

1 **Standard Free Floating Wind Tee:** Responds only to flow of air. Constructed to meet CAA Specification L-808.

2 **Standard Free Floating Wind Tee with Position Indicating Transmitter:** Responds only to flow of air. Selsyn position indicator system shows true position of tee to operator in control tower.

3 **Wind Tee Complete with Automatic No-Wind Return and Position Indicating Transmitter:** Responds only to flow of air above predetermined low velocity (cutout velocity). The cutout velocity is adjustable between 5 and 15 mph. When wind drops below the cutout velocity, a motor automatically rotates the tee to the predetermined no-wind position (usually the preferred direction on the longest or preferred runway). The predetermined no-wind position is set mechanically in the base of the tee. The tee is held in the no-wind position until the wind velocity exceeds the cutout velocity when it again floats freely with the wind. The tee is complete with selsyn position indicating transmitter.

4 **Wind Tee with Operator Control and Selsyn Position Indicating Transmitter:** Tee responds to remote operator control when wind velocity is below cutout velocity. When wind exceeds the cutout velocity, motor is automatically disconnected from the circuit and the tee floats freely with the wind, preventing damage to the tee in strong winds. Tee is complete with selsyn position indicating transmitter.

5 **Combination Wind Cone and Wind Tee:** It is always desirable to have a wind cone in addition to a wind tee. The wind cone is extremely sensitive and indicates wind velocity and true wind direction at all times. The addition of the wind cone is particularly recommended for the operator controlled tee and the no-wind return tee. If the wind cone and wind tee are mounted adjacent to each other on the ground, the pilot's view of the tee is obstructed by the wind cone at certain angles. Where the wind cone is mounted on top of the wind tee, a pilot can quickly and easily determine the best landing direction and also the actual behavior of the wind.

Special Features: A flashing mechanism and controls can be added to the wind tee circuit to provide operation of the lights either steady burning or flashing. Red lights can be furnished in addition to the green lights on the wind tee, which is sometimes desired for traffic control.

Write for additional information.

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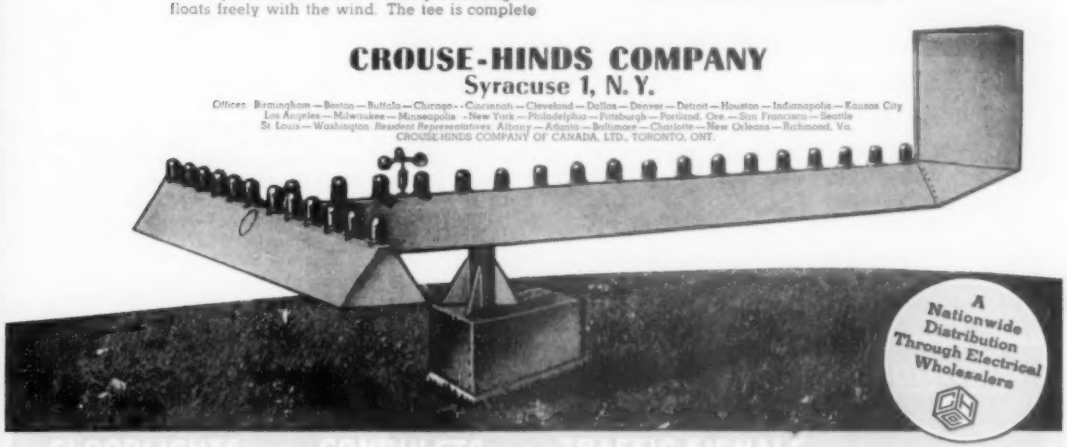

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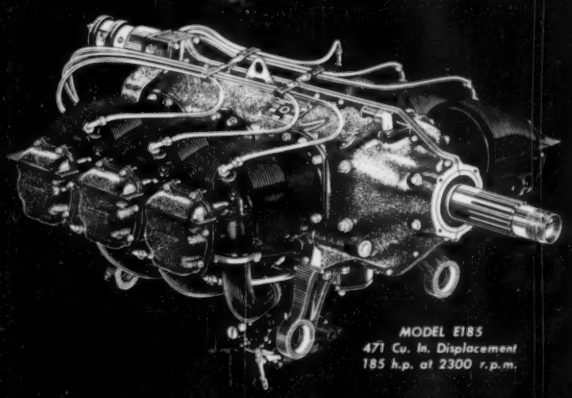

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plained by the "seating" which takes place during run-up. Then the bearings and shafts have made their own alignment, and the problem of assembly alignment largely vanishes.

GE's plant engineers have paid attention to details, too. Take the overhead chain hoist. This type of hoist, used just about everywhere in industry, has two chains or ropes hanging down. You pull on one, and the hoist lifts; haul the other, and the hoist lowers. But which line is which, is never clearly indicated. At GE, the line handles are little wooden arrows, one pointing up and the other down. Either by sight, or feel, you know which direction the hoist is going when you haul the line.

▶ **Testing**—Two things dictate the design of engine test cells—engine performance and neighbors' irritabilities. GE has built 33 new test cells at Lockland, with both factors in mind.

An experimental cell was first built and tested at the company's Lynn plant; it served as a model for the series at Lockland. In designing the cell, GE engineers developed a special cement with sound-absorbing qualities. This cement, plus volcanic ash aggregate and a filler of hard shale, makes the cells capable of taking temperatures over 1,000F. Ordinary concrete begins to deteriorate at temperatures above 500F.

Blocks and barriers remove a lot of the noise. At both ends of the cell, there are high-frequency insulators—stainless steel and spun glass grids—which absorb most of the compressor whine and exhaust howl. And there are blocks of aluminous cement—to absorb low-frequencies—at the exhaust end.

Cells are 114 ft. long. The intake end is topped with a hood which turns the entering airflow and also acts as a partial sound baffle. Air flows down through the high-frequency sound removers and into the test cell itself.

The engine exhausts into a bell-mounted ejector which carries the hot gases to the stacks. The gases pass through low-frequency absorbers and then through high-frequency absorbers before being discharged outside.

▶ **Control Room**—Most impressive technical accomplishment at the Lockland plant was the control room design. Each room, mounted between a pair of test cells, is floated on rubber supports and surrounded by an air blanket.

This isolation from the roaring engines next-door is so successful that the whispered voice, or low conversation, can be heard from one end to the other. You enter the room and get the impression that you have walked into the study of a library. Then you look through one of the windows and watch a J73 blasting away within ten feet of you—but you don't hear anything.

As a matter of fact, the GE engineers

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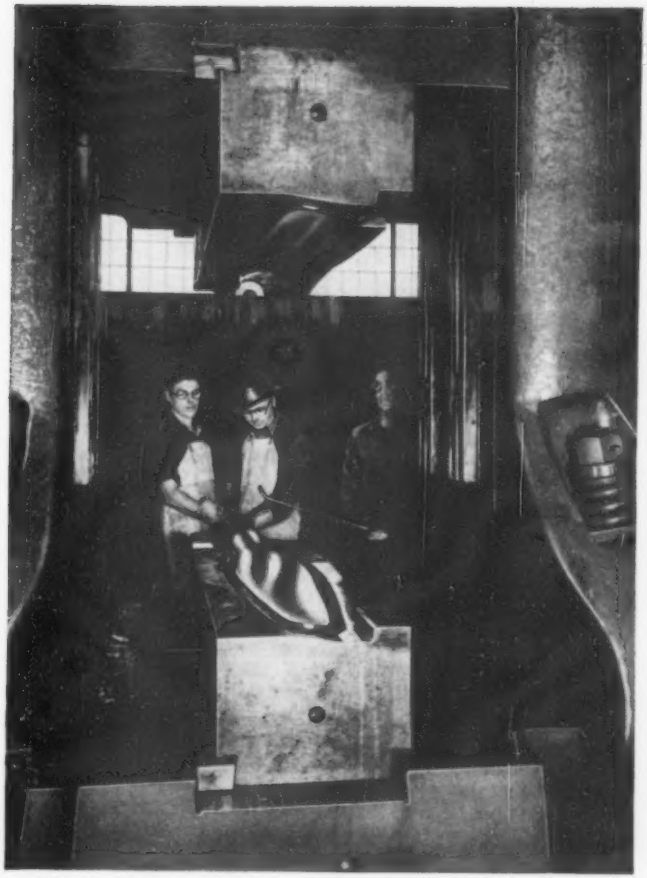

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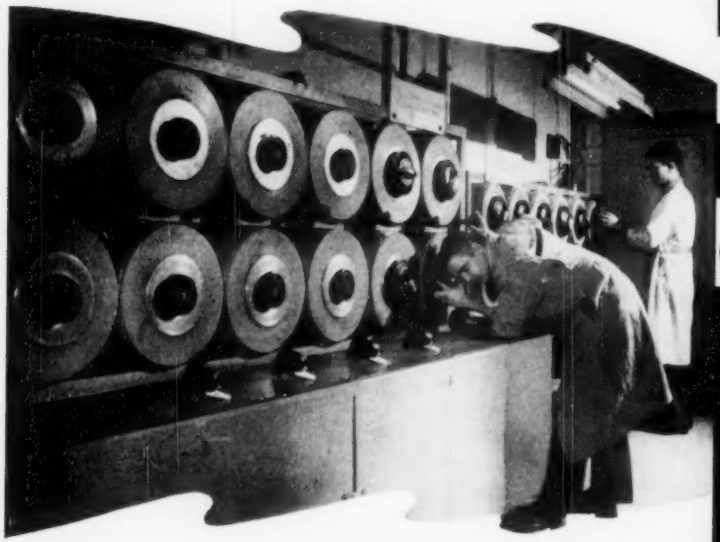

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assigned to the cells have asked for the installation of mikes and speakers so that they can hear the engine noise.

From control room to test stand run about 500 electrical leads for control and instrumentation. Two hundred pressure points feed into the recording instrumentation of the test cell. Temperature measurement accounts for another 200 leads.

▶ **Running Engines**—GE had four engines running in test cells for the anniversary celebration. One of these engines was a venerable Type I-A, run again after years in storage. After it had been taken out of storage, checked and set up, it fired on the first start.

In another test cell, a J47-GE-17 was demonstrated with and without reheat. In a third cell, the J73 (which had been the J47-GE-21) blasted away.

There was a fourth engine—the new J53—running behind a closed set of cell doors. It was kept from the press and public relations people, but others who had been cleared by security saw the engine. There has been considerable speculation in the press that GE had intended to demonstrate this engine as the keynote of the show, but had to switch to the −27 instead because of security.

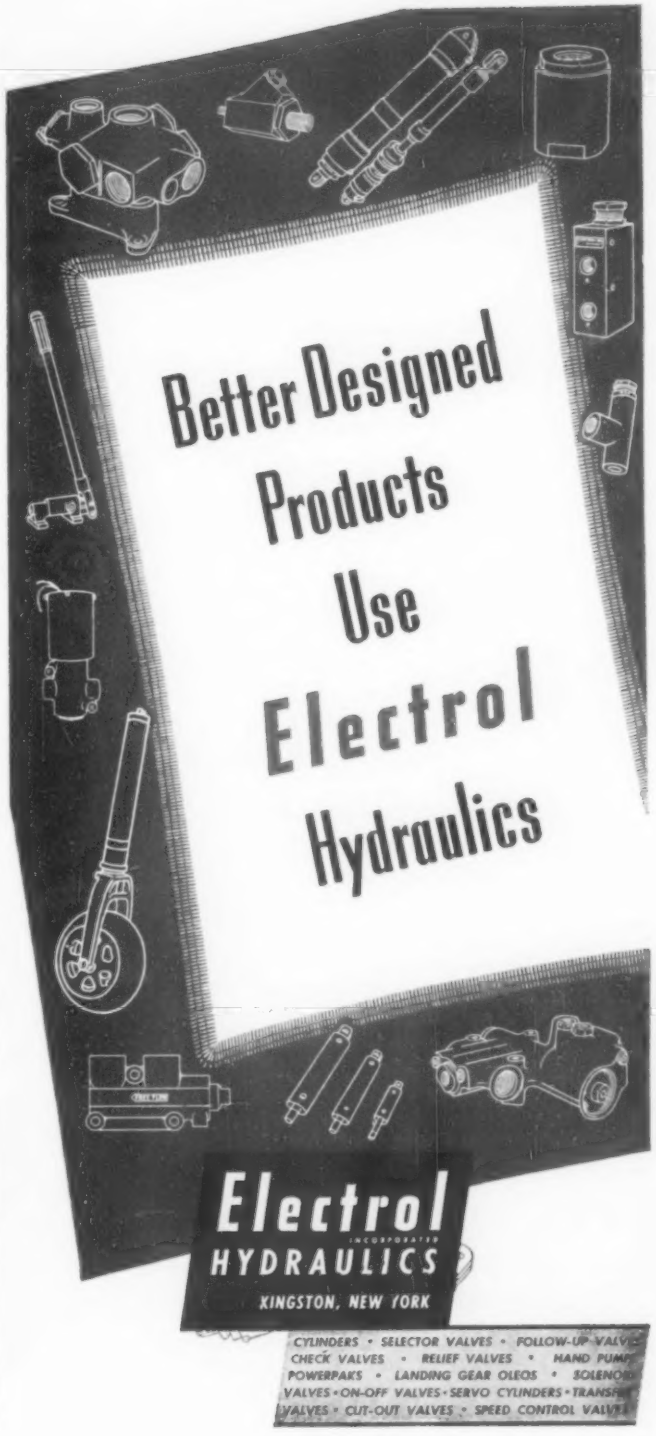
▶ **Strong Security**—Speaking of security, every possible precaution had been taken in the GE factory and test areas. Office markers and signs had been taken down or covered. In the test cells, every dial, gage and control was masked with tape.

Even the designations of the instruments—little placards which stated what they measured—were covered. Questions directed to anyone but the official guides met with polite requests to "ask the guide." There were many police around as guards and guides.

▶ **Lockland Future**—The engineering minds that brought the 1,300-lb. thrust of the I-A up to the estimated 15,000-lb. figure of the J53 are working on more advanced projects. Many of these are other turbojet engines, based on and extrapolated from today's knowledge.

But one of them is the Aircraft Nuclear Propulsion project, begun here (as a continuation of the pioneering efforts of Fairchild's NEPA project) in February, 1951. And in about five years, when the first aircraft is ready to fly on the power locked in the heart of the atomic nucleus, the engine nameplate will carry the familiar GE monogram and the words, "Lockland Plant."

GE likes to call the jet decade just passed, "The fastest ten years in history." There's no argument with that. Judging from the current rate of expansion, and some of the plans that GE mentions, the next ten years should be one level higher yet.



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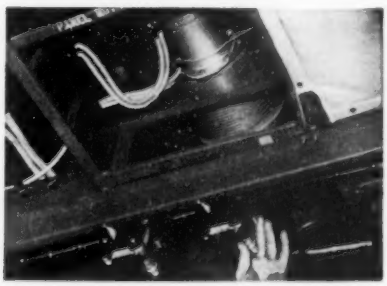
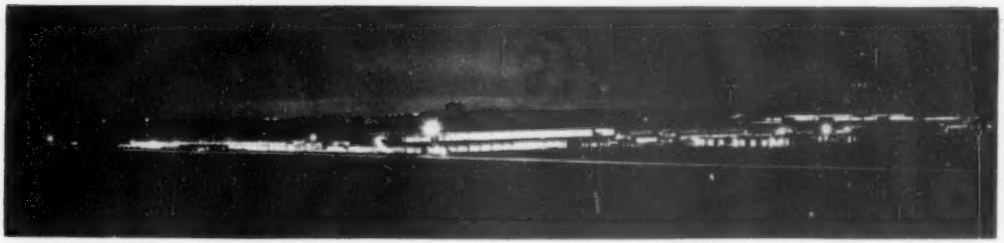


Breeze rotary actuator releases twenty 500 lb. paratainers from Fairchild Packet in 10 seconds.



HIGHLIGHTING the production buildup is night view of Pratt & Whitney Aircraft's East Hartford plant which works round-the-clock.

New Light Shed on Production Picture by Annual Reports

By William Kroger

The high cost to both government and industry of dismantling a production machine and then trying to rebuild it in a hurry is being spread across the figure-flecked cautiously optimistic annual reports of the aircraft manufacturers.

It is more than ever apparent now that 1951 was a get-ready period, enormously costly to both industry and the military services. And careful reading of the reports also gives rise to a belief that 1951 military **deliveries** were nowhere near as high as the previously estimated **production** of 4,500-4,800 planes would indicate.

▶ **Money Lack**—While the manufacturers were collecting tools, hiring and training manpower and gathering up materials, production was merely creeping along; and the large increases in sales barely managed to cover costs.

The result was that the military was called on for progress payments that are assuming staggering proportions. One effect of this was to reduce funds available for new contracts and perhaps some aircraft acceptances. This may be another key to the reason for the stretchout.

Aggravating the manufacturers' situation were two other factors:

• **Government pricing policy,** perhaps influenced by Administration and Congressional demands for economy, was cutting manufacturers' profit margins to the bone.

• **Higher taxes,** especially the Excess Profits Tax, were usually taking a larger share of operating incomes than the companies retained as profits.

In 1951 the military services got relatively few planes for the vast sums paid out. They weren't buying planes, as the following analyses by this writer show. They were buying preparation.

Lockheed: Buildup Boosts Costs

In the year ending Dec. 31, 1951, Lockheed Aircraft Corp., and a few others, showed a drop in operating profit, net profit and tax liability.

President Robert Gross comments, "This reduction can be attributed to the increased costs inherent in the buildup stage of our program, such as personnel, rising prices and wages, but particularly to the continuous pressure exerted by government agencies for reduction of profits upon military business."

In Lockheed's case, a 7% rise in expenses (as a percentage of income) pushed 1951 profit before taxes down to $9,842,000 on income of $241,399,364 against 1950 profit before taxes of $15,067,219 on income of $173,330,839. The resulting tax liability dropped from $7,857,285 in 1950 to $4,048,557 in 1951.

▶ **Tight Profit Lid**—Few reports issued to date so clearly illustrate how tightly government contracting officers are squeezing the lid on aircraft manufacturers' prices. And while they were doing it in 1951, Lockheed's employment was shooting up from 20,241 to 39,523, and the company was engaged in preparing for B-47 production in Marietta and opening new satellite plants near the home establishment in Burbank, Calif.

But the effort was more in getting ready for production than in producing. Gross expects results to be better this year. Last year, Lockheed delivered slightly more airframe weight than 1950's 7,001,000 lb. The report says that deliveries of planes in 1951 were more than one-fifth greater than in 1950.

More than nine-tenths of the delivered planes, the report states, were for the armed forces and constituted about one-sixth of all U.S. military aircraft production last year. Lockheed also delivered 20 Constellations and four Super Constellations, whether for commercial or military customers is not specified, although probably commercial.

The significance of the three figures—nine-tenths military, one-sixth of all U. S. military planes, 24 commercial—could be that either U. S. military production in 1951 was far lower than any estimates yet made, or that the Lockheed report is discussing deliveries only as distinct from production.

If the 24 Connies and Super Connies were more than one-tenth of Lockheed deliveries, total **deliveries** would be something over 240, with 216-plus being military. That is a great deal different than the 750-800 planes which would be one-sixth of the estimated 4,500-4,800 military aircraft heretofore believed **produced** last year.

▶ **Georgia Report**—The Lockheed report is revealing in other respects. Backlog at the Georgia division, where the B-47 bomber will be produced, is $458,700,000. Part of that backlog is for the modernization of B-29 bombers. The first was completed in December. At the end of the year, Marietta employment had passed the 10,000 mark.

Meanwhile, tools for the B-47 were being put in place and orders for supplies let. Actual production is expected to begin in the second half of this year. According to previous information, the first Marietta B-47 is due in April or May of 1953. Lockheed says the B-47 orders have been increased, but the time to produce them has been extended.

The report sheds other light on Lockheed:

• **Jet transport work** in the past two years has cost Lockheed nearly $500,000 "in developing a basic design that we feel will meet future needs of airlines and the military," although the company says it does not yet have orders for such a transport.

• **Breakdown of sales** was 66% for the Air Force, 18% for the Navy and 16%

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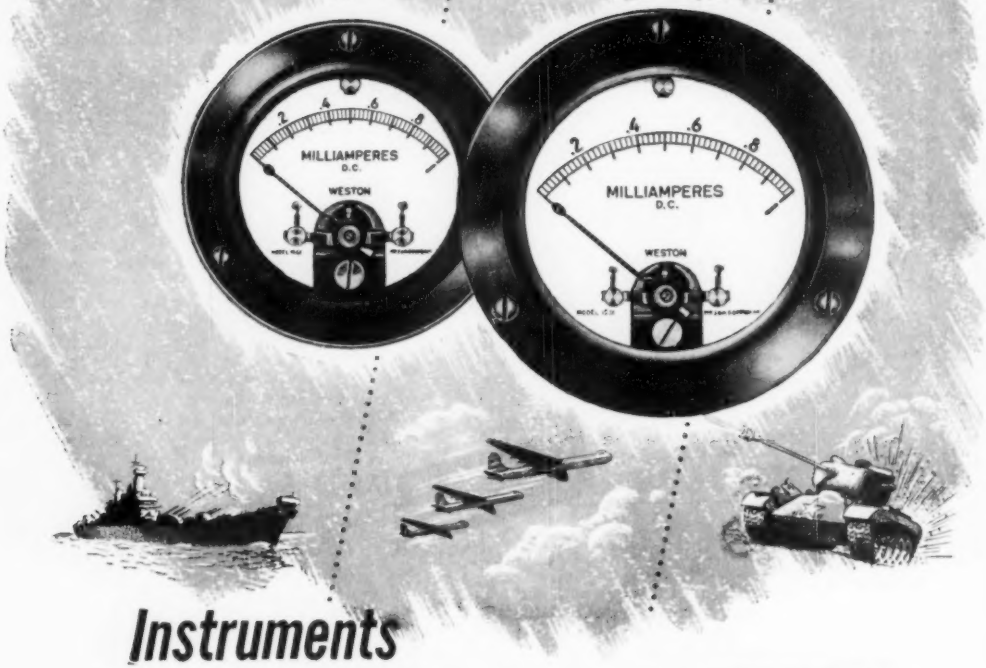

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for company's commercial customers.

• **Backlog** at the end of the year was $970,435,000, but contracts being negotiated would push it to $1,150,500,000, highest in the company's history. More than $1 billion represents business for the California division.

• **Transport backlog** is $152 million for USAF and Navy versions of Super Connies and Connies, and $115,721,000 for 75 commercial Super Connies for ten airlines.

• **A new Navy design**, still restricted, was one of two competitions won last year. The other was for the Air Force's medium-sized cargo transport, XC-130, to be powered by four Allison T-38 turboprop engines.

NEW BUILDING at Wichita frames B-47s, both key points in Boeing's expansion.

Boeing: Rising Progress Payments

The report of Boeing Airplane Co. furnishes a good example of the industry's situation last year, although there was one unique aspect to the company's operations. Boeing says its "largest program" was switched from a cost-plus-a-fixed-fee contract to a fixed-price basis. (This apparently is the B-47 project.)

Under a CPFF contract, a manufacturer reports profit as work is performed. Under the usual fixed-price deal, profit is not charged up until actual delivery. So the situation of most manufacturers was compounded for Boeing. The company's own work on the B-47 is understood to be progressing nicely, eating up millions of dollars in manhours and materials. But deliveries have been slowed by delay of items Boeing does not make.

So Boeing's balance sheet for the year ending Dec. 31, 1951, shows charges on military work of $232,342,102 and payments against those charges of $204,240,677, not a penny of which had gone into the sales account by year-end. At the end of 1950, the company's balance sheet showed only $22,245,335 worth of work in progress with an offset of $10,182,686 in progress payments.

Boeing's sales and other income for the year totaled $337,957,026, compared to $307,806,262 in 1950 (AVIATION WEEK Mar. 31, p. 7). Profit last year was $7,140,751 after taxes of $12,700,000. For 1950, profit was $10,826,558 after taxes of $13,400,000.

The result of Boeing's operations clearly shows the effect of rising costs, the government's low profit margin policy and what happens when a manufacturer must carry millions of dollars in deferred accounts rather than passing the money into sales.

Boeing's President William M. Allen points out in the 1951 report that a year earlier he had predicted that 1951 operations would yield a lower net. Now he says that 1952 should "show considerable improvement." Here was the Boeing picture at the 1951 year-end:

• **Backlog was $1,355,000,000**, not including letters of intent for which prices have not been negotiated. About 4.75% of the backlog covers CPFF contracts.

• **Facilities expansion** had cost $5.2 million up to Dec. 31 and this year Boeing expects to spend $14 million additional for this purpose.

• **C-97 orders** have been increased and production will be stepped up over the next few years. All new contracts on this type of plane will be for the KC-97 tanker version which can be converted quickly for personnel or cargo transport.

• **B-50 production** is ending, with only a small number remaining to be delivered.

• **B-47 modification** will be undertaken at Tucson under a subcontract granted by Boeing to Grand Central Aircraft Co. Boeing is lending personnel and know-how to start the program.

• **Boeing gas turbine engines** have

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• Complete description of how and why rotor stall occurs and how it can be minimized.

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• Clear, simple explanations of basic static and dynamic stability concepts in terms of helicopter performance.

• Non-mathematical explanation of the origin of vibrations that act on rotor and fuselage.

• A concise review, in the beginning of the book, of helicopter types and configurations, design features, performance, and stability and control characteristics.

• An extensive bibliography on rotating-wing aircraft, including all pertinent NACA papers.

Are these helpful books on your working reference shelf?

• INTRODUCTION TO THE STUDY OF
Aircraft Vibration & Flutter

By Scanlan & Rosenbaum. An authoritative, up-to-date text and reference on aeroelasticity, bringing together and coordinating the concepts, techniques and data from aerodynamics, mathematical analysis, aircraft structures and testing that bear on aeroelasticity.

• **Aircraft Drafting**

By Katz. Thorough training not only in all details of aircraft drafting and lofting but also in the engineering and production processes useful for the draftsman to know.

• **Flight Testing**

By Hamlin. Clearly explains and standardizes methods of obtaining and analyzing flight-test data for both conventional and jet planes.

See them on approval

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☐ Aerodynamics of the Helicopter $6. ☐ Aircraft Vibration and Flutter $10. ☐ Aircraft Drafting in one $3.50. ☐ Flight Testing $3.

Please send me the books checked. I will either remit in full or return the books in 10 days.

Signed .....

Address .....

.....

INFORMATION on positions at NORTHROP

Northrop Aircraft, Inc. is engaged in the most absorbing work of a long career devoted to scientific and engineering development, as well as aircraft production. This includes new, long-range projects of the utmost importance and interest. Exceptional opportunities await qualified individuals.

The most responsible positions will go to top-caliber engineers and scientists. However, a number of excellent positions exist for capable, but less experienced, engineers. Some examples of the types of positions now open are:

ELECTRONIC PROJECT ENGINEERS... ELECTRONIC INSTRUMENTATION ENGINEERS... RADAR ENGINEERS... FLIGHT-TEST ENGINEERS... STRESS ENGINEERS... AERO- AND THERMODYNAMICISTS... SERVO-MECHANISTS... POWER-PLANT INSTALLATION DESIGNERS... STRUCTURAL DESIGNERS... ELECTRO-MECHANICAL DESIGNERS... ELECTRICAL INSTALLATION DESIGNERS.

Qualified engineers and scientists who wish to locate permanently in Southern California are invited to write for further information regarding these interesting, long-range positions. Please include an outline of your experience and training.

Allowance for travel expenses.

Address correspondence to Director of Engineering,

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U.S. Air Force Northrop Scorpion F-89s are guarding America's boundaries in ever-increasing numbers. The Scorpion is designed and built by the engineers and craftsmen who produced the deadly Black Widow P-61 of World War II fame.

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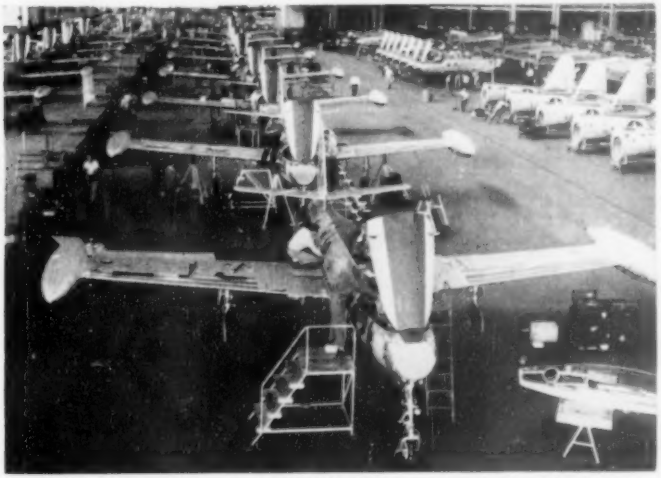
PIONEER BUILDERS OF NIGHT AND ALL WEATHER FIGHTERS

turned up a nice field of business. Substantial orders are on the books at Seattle, with more expected. Principal use is in minesweepers, although the Navy has awarded Kaman Aircraft Corp. a contract to test a Boeing gas turbine engine in a helicopter.

• **Employment** has passed the 50,000 mark. Average employment during 1951 was 47,699, 30,524 in 1950.



BUSIEST aircraft production line in 1951: F-84Gs move through Republic plant.

Republic: Buildup Yields Planes

The story of how a company more than doubles its employment, spreads a network of subcontractors almost from scratch, and still builds up to high production all in one year is the tale told in the annual report of Republic Aviation Corp.

Republic had a little more than 5,000 employes dawdling out only ten F-84s a month when war broke out in Korea in June, 1950. By the end of 1950, employment was up to more than 7,000. At the end of December, 1951, more than 18,000 workers swarmed in the Farmingdale, L. I., plant.

The subcontracting had been planned previously, but not set up. Yet, at the end of last year, Republic was dealing with 2,200 subcontractors and suppliers.

Production rates, of course, are classified, but a tour through the Republic plant in conjunction with the issuance of the annual report convinced observers that monthly production now is at least 50 planes, and perhaps even higher.

Despite this record, the Republic story is much the same as that told in the other reports as far as high deferred charges and low profit rates are concerned.

► **Balance Sheet**—The Dec. 31 balance sheet shows $77,436,839 worth of inventories and work in progress, against which progress payments totaling $55,462,263 had been received.

Income for the year was $130,440,552, more than double the 1950 income of $57,713,432. But 1951 net after taxes of $5,148,306 was $2,934,613. In 1950, taxes took $2,260,000, and net profit was $2,355,006.

Republic's stepped-up deliveries yielded more than double the revenue, but only about half a million dollars more in profit.

"When the American people turn to the aircraft industry in a period of emergency," President Mundy Peale comments, "they call upon it not for a prototype of a superior plane but for hundreds of perfectly functioning aircraft rolling off the production lines. This means that the industry has an obligation to have in operation vast and complicated production facilities, the purchase of which must be financed."

It was getting those production facilities, both plants and people, that was so costly and confusing at the same time Republic was increasing its production.

The company opened up an office in New York City to house about 350 engineers. It leased a 216,000-sq. ft. plant at Port Washington, L. I., a 40,000-sq. ft. building at Greenlawn, L. I., and 180,000 sq. ft. at Montauk, on the far tip of Long Island. It started construction of 40,000 sq. ft. at its Farmingdale factory.

► **Employe Training**—Republic set out to ease its engineering shortage by hir-

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. . . to work in one of the most rapidly expanding companies in America, with an acknowledged need for its products in the defense of our country, but with an equal appeal for the untapped commercial market when the defense job is completed. Such a future presents a REAL OPPORTUNITY for advancement.

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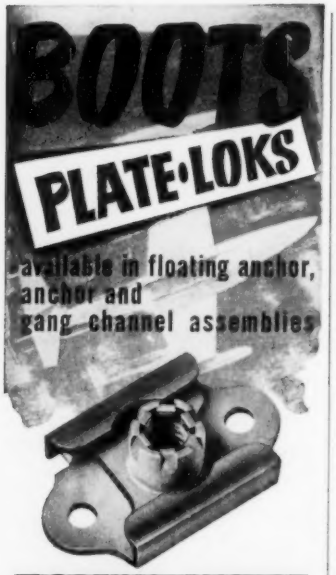

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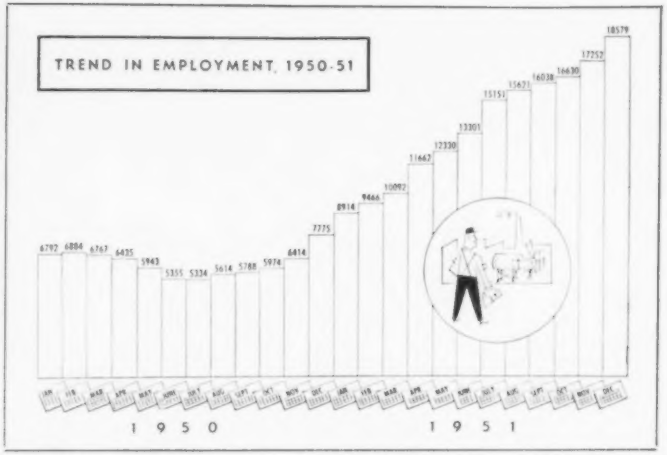


CLIMBING EMPLOYMENT, illustrated by this Republic chart, harassed all companies.

ing non-aviation engineers and training them on the job. By the end of the year, it had recruited 495 new engineers. Production workers were trained by a new branch of the Casey Jones School of Aeronautics, near Farmingdale. Of the 5,860 direct production workers hired during the year, 3,300 went through this school. At the end of the year, new employes were being trained at a rate of 200 each week.

Other news of Republic in the report:

• Backlog at the end of 1951 was $580 million, not including letters of intent which, if successfully converted to contracts, will add $240 million more.

• **Final F-84E** rolled off the line last summer, and current production model is the longer-range F-84G.

• **Production of** F-84F and RF-84F is scheduled to begin late this year, although observers believe that lack of Wright J-65 Sapphire engines may delay this date. (The F-84Fs now flying have British-built Sapphire engines.)

• **Subcontractors** produced 40% of the F-84.

United: Working for Taxes

Tooling up, training a flood of new employes and other costs are reflected also in the report of United Aircraft Corp. for the year ending Dec. 31, 1951. But UAC retained its place at the top of the industry with a net profit of $14,266,867, an increase of more than $1 million over 1950.

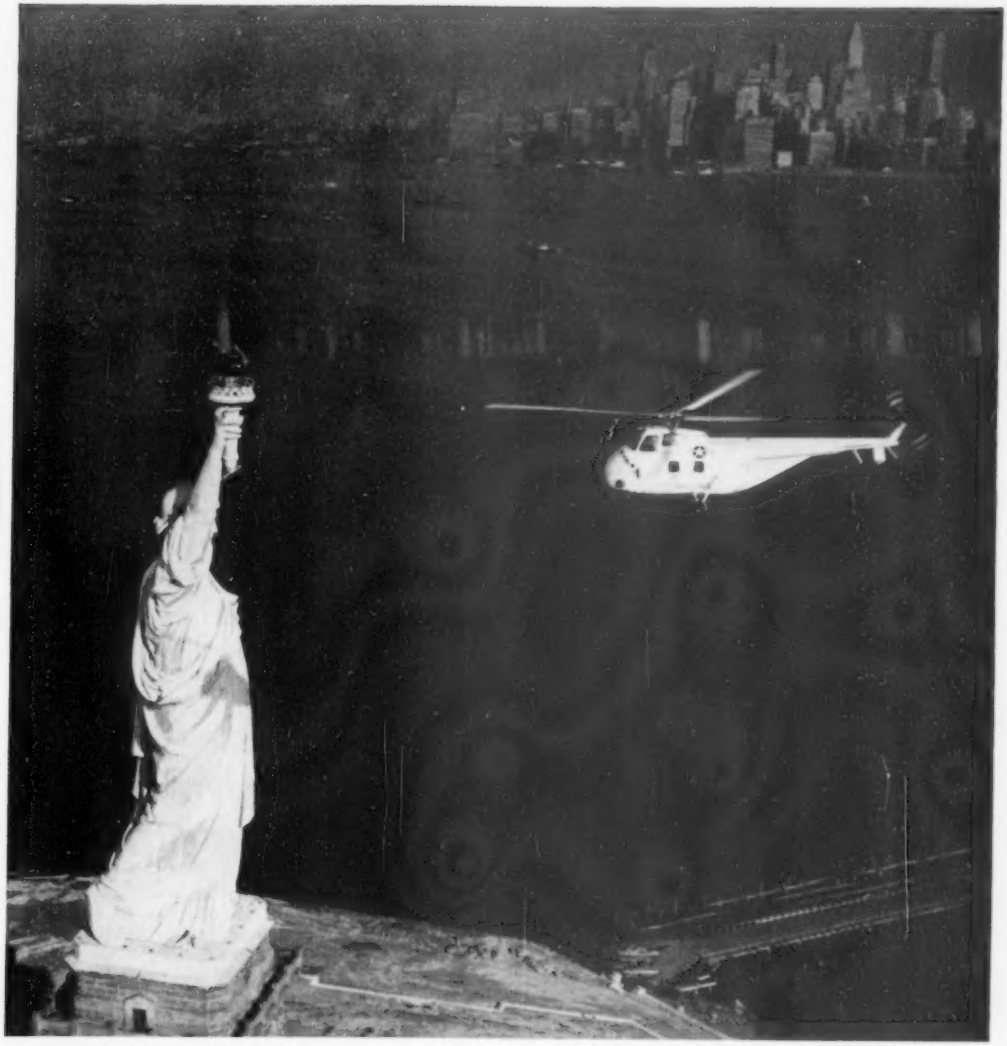
Increase in sales in 1951 over 1950 was proportionately much greater than the profit increase. Total income in 1950 was $418,571,382, against $270,736,874 in 1950. But the tax bite increased from $12,593,797 to $16,989,738. That tremendous increase in taxes is a substantial amount to be absorbed even by a company of United's size.

While that amount was being taken out of profits, UAC was putting to work nearly 15,000 new employes (to boost employment to 43,347), and putting more than $15 million into new facilities. Despite progress payments from the government of $98,298,555, United's working capital during the year dropped from $89,974,014 to $80,448,115, and it was necessary to borrow $25 million of a line of credit of $60 million.

► **J57 Lead Time**—One of the reasons United suffered such a drain on its resources is indicated in the pictorial report that accompanies the company's annual statement. It is stated that the lead time on the Pratt & Whitney J57 jet engine, from conception to test approval, was five years. As study on the engine began in the summer of 1946, that would place the end of the initial lead time at last summer.

The report then says that the "period required to bring an existing jet engine into quantity production is generally estimated to be from 18 to 24 months." That would mean that at the outside, the J57 is still more than a year away from high volume output that will start to yield large sales to the company and liquidate inventories.

That fact is significant in regard to the Air Force's buildup. The J57 is to power the Boeing B-52 and Convair B-60 strategic bombers, one or both of which is supposed to supersede the B-36. Further, the report states the J57 is to power two new Air Force fighters which are not identified but which must be the Convair F-102 and North Ameri-



U. S. COAST GUARD PHOTO

Versatility Unlimited—With the recent addition of the big, ten-place HO4S Sikorskys to its helicopter fleet, the U. S. Coast Guard is in a better position than ever to carry out the wide variety of missions for which it is justly recognized. Almost as soon as they were delivered, they were used by Coast Guardsmen to airlift medical aid to travelers on a snow-bound train high in the Sierras and to save five survivors of a bomber crash in Washington's Olympic Mountains.

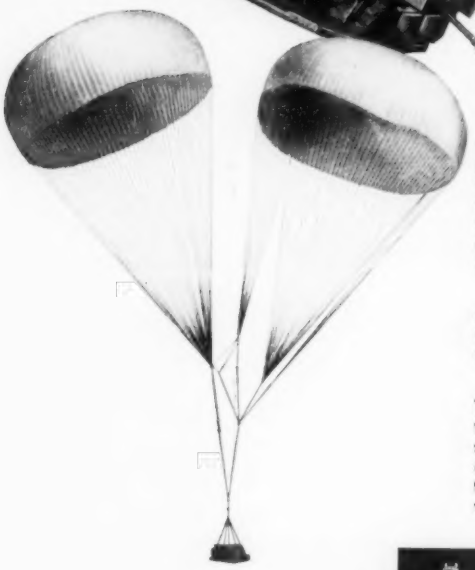
Ever since 1943, the Coast Guard has pioneered in the use of helicopters for search, rescue and other missions. With the continuing improvement in helicopter performance provided by Sikorsky, this versatile type of craft has become indispensable to the Coast Guard.

The Coast Guard also uses Sikorsky helicopters in such vital duties as security checks of ships and anchorages . . . checking harbors for oil pollution . . . inspection of navigation aids . . . harbor surveys and numerous other missions all performed with greater efficiency by the helicopter than by any other means.

SIKORSKY AIRCRAFT

BRIDGEPORT, CONNECTICUT

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION



PARACHUTES produced by Pioneer MAKE THE DIFFERENCE!

Yesterday's miracles are now daily scheduled performances. Not long ago, it seemed incredible that a plane could be built big enough and powerful enough to lift and fly heavy cargoes like jeeps, howitzers and steel bridges and other equipment weighing many tons! . . . It seemed even more incredible that parachutes could be built large enough and strong enough to drop these cargoes safely.

Today "non-stop" airlifts are dropping cargoes of every kind swiftly, surely and safely, on target wherever they are needed on a daily scheduled performance . . . made possible by *dependable* cargo chutes!

Throughout the development of this vital operation, The Pioneer Parachute Company has kept pace with the industry's needs. Pioneer's years of experience, research and vast production facilities have built absolute dependability into every Pioneer parachute. These qualities have made and kept Pioneer the acknowledged world leader in parachute manufacturing.

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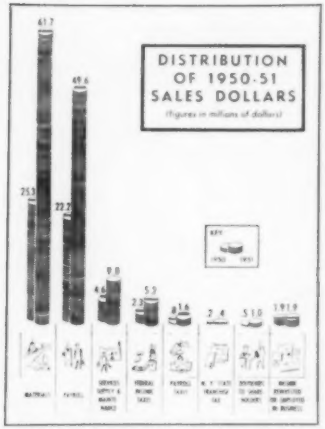

WHERE THE MONEY GOES at Republic—but this is fairly typical in the industry.

can Aviation, Inc. F-100 interceptors.

Other highlights from United's Report:

- **Backlog** is up to $1.3 billion, from the $715 million on the books at the close of 1950.
- **Floor area** of all the corporation's divisions and Canadian subsidiary will be about 10 million sq. ft. when expansion is completed.
- **More than 90%** of all domestic and commercial transports now operating are equipped with Hamilton Standard propellers.
- **Ninety-seven** S-55 cargo helicopters have been ordered by the Army Field Forces and first deliveries have been made. Three-to-four-place S-52s also have been delivered to the Army. The S-51 has gone out of production.

NAA Polls Suppliers

In an effort to evaluate its expenditures for materials, supplies and services and how this spending is distributed between large and small businesses, North American Aviation, Inc., Los Angeles, has distributed self-addressed, stamped questionnaires to its outside suppliers.

Here are the questions asked by NAA of its suppliers: Are you a manufacturer, sales agent or a jobber? How many people do you employ? Is your company a division or subsidiary of a parent company? If the answer to the previous question is "yes," what is the enrollment of the parent company together with that of its subsidiaries and divisions, and are your sales combined with those of the parent company in one operating statement? What is the approximate percentage of direct workers to total enrollment?

NAA estimates that it spends 50% of its aircraft dollar on the outside.

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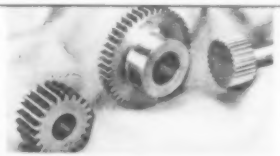
He knows from past experience that his gears will be produced as specified. He is only one of hundreds of customers who have Vinco working at capacity. They know that the name Vinco is synonymous with dependability — true yesterday, today and tomorrow. These customers also agree that Vinco has no peer in the spline gage field. So if you require spline gages or a gaging program, consult Vinco at once.



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Master spur, worm and helical gears, by Vinco, are the ultimate in precision and finish. Men who know, have Vinco make their master gears.

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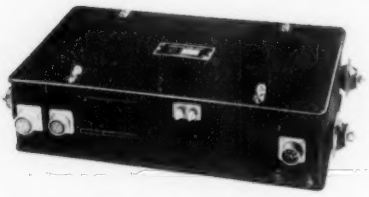
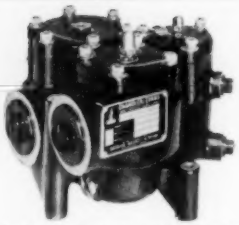
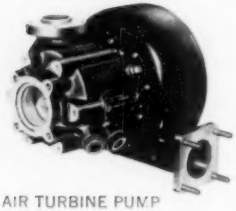


CONTROL BOX containing sequencing relays and temperature control circuit.

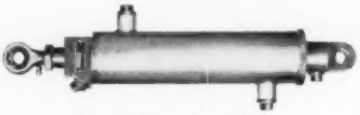


AFTERBURNER FUEL REGULATOR

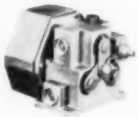
THERMOCOUPLES



AIR TURBINE PUMP



HYDRAULIC CYLINDER



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We believe our engineering counsel, backed by extensive manufacturing and test facilities, can be valuable to you in building better and safer jet aircraft today and tomorrow. Your inquiry is invited.

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PRODUCTION BRIEFING

▶ **Fairchild Aircraft division,** Hagerstown, Md., has selected Calabro Construction Co., Elizabeth, N. J., as the major contractor for its proposed $7-million expansion program, bringing production floor space to 500,000 sq. ft.

▶ **Flexonics Corp.** is new name for former Chicago Metal Hose Corp., Maywood, Ill., maker of flexible metal hose, aircraft parts and other applications for industry.

▶ **Goodyear Aircraft Corp.,** Akron, Ohio, has started output of Republic F-84 stabilizers and elevators under subcontract. Work will run well into 1953.

▶ **Sherwin-Williams Co.,** Cleveland, has received an exclusive manufacturing and distributor's license from Northrop Aircraft, Inc., covering the latter's Seal Primer #75. S-W will make the zinc chromate primer in Chicago, Los Angeles and Oakland.

▶ **Lear, Inc.'s** California division will put up a 200x350-ft. building on Centinela Blvd. adjoining the southern section of Santa Monica Airport.

▶ **Luscombe Airplane Corp.,** Garland, Tex., has let contracts to enlarge its main factory building and process building by 85,000 sq. ft. of floor space.

▶ **North American Aviation, Inc.,** Los Angeles, has leased over 9,400 sq. ft. of factory area in Culver City, Calif., to handle work for its electro-mechanical department, which designs and develops automatic pilot, fire control and navigation systems for aircraft and missiles.

▶ **Prewitt Aircraft Co.,** Clifton Heights, Pa., has signed a ten-year lease for the entire 50,000 sq. ft. of factory and office floor space in a building which the firm had partly leased since the spring of 1951.

▶ **Reynolds Metals Co.,** Phoenix, Ariz., will operate under contract a 400,000-sq. ft. addition to its present plant to house two large presses for stamping out bomber sections—one of 12,000 ton capacity and the other 8,000 ton. The facility will be built and owned by USAF.

▶ **Rhodes-Lewis Co.** aircraft accessories maker, has occupied a 30,000-sq. ft. plant at 6151 W. 98th St., Los Angeles, and transferred most manufacturing operations from its former Culver City location.

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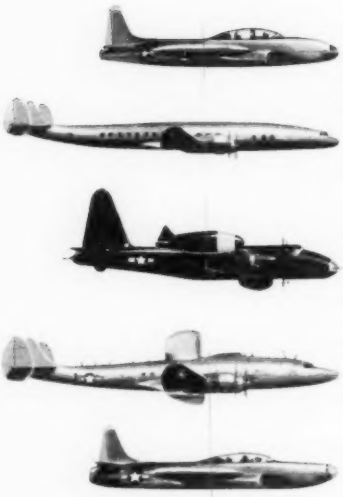
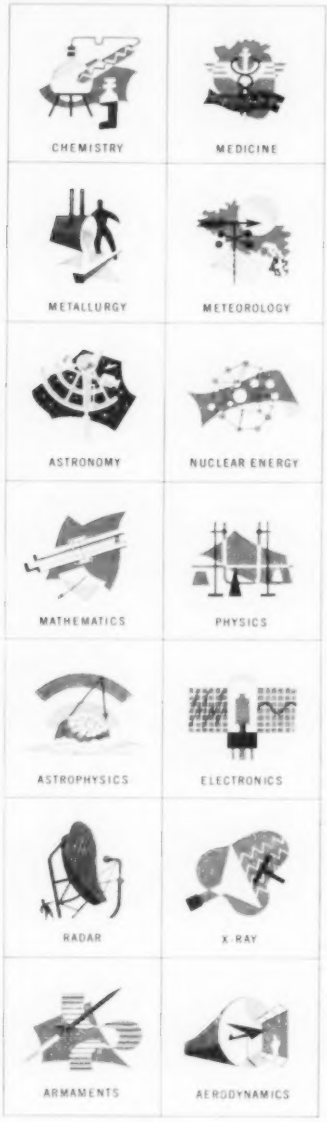


T-33 JET TRAINER
SUPER CONSTELLATION
P2V NEPTUNE
MILITARY CONSTELLATION
F-94 STARFIRE



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AIRCRAFT DESIGNING and construction are *precise* sciences. That's why Lockheed Engineering has more departments than a big university.

Lockheed's several thousand scientist-engineers work on more than 150 major projects—to build the utmost *precision* and *dependability* into Lockheed aircraft.

LOCKHEED'S ENGINEERS must have all the right answers for each vital part of every airplane. Will it stand heat, cold, tropical damp, corrosion, sand, dust, stress, strain, torque—and exactly how much? Can it be made lighter, stronger, smaller, simpler, more economical, better in any way? If the right metal doesn't exist, Lockheed scientists develop one. If a new machine is needed, Lockheed engineers invent one. There's always a new problem, because Lockheed is always looking for a better method—always building better aircraft.

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For information about Lockheed's on-job training, write: Engineering Section, Employment Dept., Lockheed, Burbank, Calif.

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As modern aircraft extend beyond sonic speeds and penetrate the outer limits of the atmosphere, new problems of design, materials, power, safety and pilot comfort arise, requiring the kind of scientific research facilities now found at Lockheed.

New buildings, providing laboratories in nearly every known science, have been added to Lockheed's Research Center in Burbank, Calif. Each building was designed for a special purpose. Each contributes to research, testing, invention or design —to help solve any new aircraft need or problem.

Lockheed's new 5-story Engineering Building, for example, houses a streamlined science headquarters, where engineers delve into such subjects as atomic research, pilotless aircraft, jet transports and advanced supersonic fighters.

SCIENCE CENTER

Lockheed advanced blueprints go to work in the new Research Center, which includes an aerodynamics laboratory, testing laboratory, wind tunnel, electronics laboratory, weather laboratory, chemistry laboratory and hydraulics laboratory. Here, meteorologists check the effects of every kind of weather on every vital plane part—shooting Sahara sand into engine bearings, growing tropical fungus on wiring, building Arctic ice on leading edges. These, and hundreds of other scientific tests, result in greater dependability in Lockheed planes.

Another advanced building at Lockheed is the massive Hall of Giants, which contains the nation's largest industrial equipment for building aircraft.

The new designs and methods which are developed almost daily at Lockheed are necessarily classified today. When they can be talked about, they will go down in history along with the many other Lockheed engineering firsts.

Subcontracts Face Strangulation

- **Labor Department proposes that prime contractors make their subs conform to Walsh-Healey Act.**
- **If new regulations go into force, primes would find subcontracting a hindrance rather than a help.**

By Rudolf Modley*

The Labor Department has proposed new regulations that threaten to torpedo the carefully constructed subcontracting network that mobilization officials have been urging to speed the defense effort.

Thus the Walsh-Healey Act moves into the manufacturing industry limelight once more.

Aircraft manufacturers' brushes with the act in the past have been over wage determinations, two of which have been made since the act was passed in 1936. This time, there is an effort to broaden the coverage of the act. This move may have a much more serious impact on the industry than either of the wage determinations.

If the military procurement agencies and the industry should fail in keeping the aircraft industry exempt from the major effects of proposed new Walsh-Healey regulations, the regulations may well threaten the entire relationship between prime and subcontractors on which our present military aircraft production rests to such a large extent.

On Mar. 8, 1952, the Federal Register printed a set of proposed General Regulations for the administration of the Walsh-Healey Act. These regulations will become effective July 1 unless revised or postponed. However, as things stand now, the industry has until early June to raise objections.

The following two provisions of the new regulations are the ones of the greatest importance to the industry:

- **The prime contractor** will be "charged with the duty of obtaining compliance by the secondary contractor . . . to the same extent as if he performed the work himself." (Par.201.2 (a)(2))
- **The prime contractor** "shall be liable for any failure by the secondary contractor to observe the requirements." (Par.201.2(a)(2))

Other provisions, too, may affect the industry. For instance, there is one on "Integrated Enterprises" which will force an aircraft, engine, or accessory manufacturer who makes some of his own materials or parts for the ultimate product to apply the provisions of the Walsh-Healey Act to those of his employes who make the materials and parts as well as to those engaged in the manufacture of the ultimate product.

This may put such a manufacturer under a severe disadvantage compared with his competitors who may buy such parts from manufacturers not subject to the aircraft determination or even not subject to the Walsh-Healey Act at all. Yet, the potential danger of the "policing" and "liability" provisions are so much more serious that they deserve the most study.

Purpose of Regulations

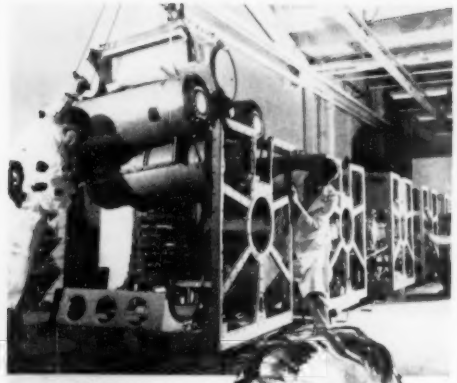
According to Gerard D. Reilly, a legal expert on the Walsh-Healey Act, the main purpose of the new regulations is to require the principal contractor to stipulate in his bid that he will be responsible for seeing to it that all persons who work on the contract (with some exceptions to be discussed later) will work under conditions which conform to the wage-hour standards of the Walsh-Healey Act, whether or not employed by the contractor. Reilly holds that this requirement goes much further than the language of the law itself.

▶**To Prevent Evasion**—Regulations issued to carry out the act were designed to prevent evasion of the act by bidders who would obtain government contracts and then have the entire work performed by some other employer who would not be covered by the act. Yet, says Reilly, none of these old regulations was designed to impose coverage upon "secondary contractors" as the term is used in the proposed rules.

It was taken for granted that a manufacturer had no concern with labor conditions in the plants of his suppliers if, in the performance of his government contract, he did the same thing with respect to the purchase of materials or component parts as he would if he were filling an order for a private customer. Questions were raised about this and the Administrator of the Public Contracts Division issued a ruling shortly after the act was passed in 1936 which is known as the "normal industry practice ruling."

Under this ruling, if a manufacturer, contrary to usual practice, sublet a portion of his government contract to another manufacturer, the second manu-

*The author, a frequent contributor to AVIATION WEEK, is, or has been, economic counsel in Walsh-Healey cases of the aircraft industry, office, machinery industry, metal business equipment industry and the electric lamp industry.



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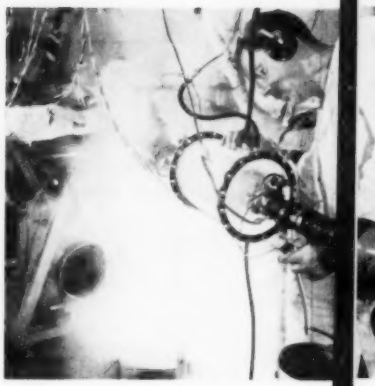

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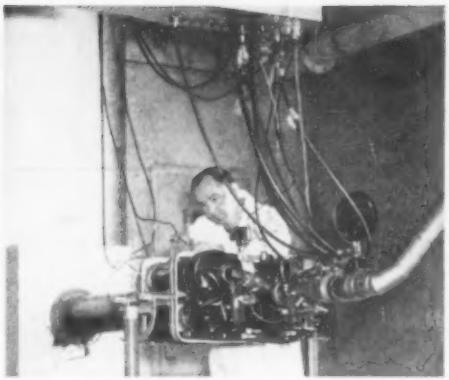

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facturer was jointly responsible with the prime contractor for complying with the labor provisions of the act. At the time this appeared just and equitable because the departure from the usual practice made it appear probable that evasion of the act was intended.

World War II Exemption

During World War II, it soon became obvious that this regulation could not be applied rigidly. There was no more "normal industry practice." In airplane manufacturing, subcontracting grew from a small percentage to 44% in December, 1944; in engine manufacturing it grew to 30%. No doubt, many aircraft manufacturers sublet portions of contracts to other manufacturers which they would previously have handled themselves. And this practice was in the interest of the government, which wanted war production to expand as rapidly as possible.

► **Okay, But No Evasion**—Therefore, it was only logical that L. Metcalfe Walling, the Administrator of the Public Contracts Division at the time, wrote to the then Aeronautical Chamber of Commerce in November, 1940, stating that "under the present state of the aircraft industry (a manufacturer of airplane parts and accessories) . . . will not have to show compliance with the provisions of the Public Contracts Act . . . even though the (airplane) manufacturer may assemble the parts into the completed airplane which he supplies to the government agency."

This finding was confirmed in a letter from the Solicitor's office of the Department of Labor in 1944 which emphasized, however, that the ruling has no application in the event of "evasion."

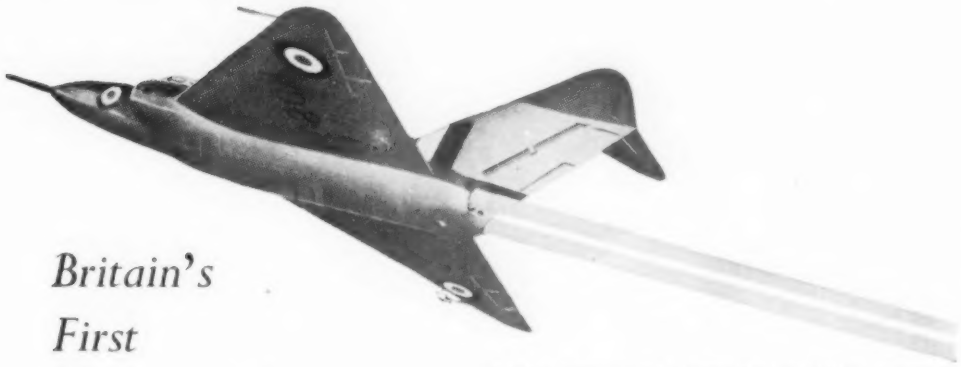
► **Exemption to Continue?**—The decisive question today is whether the Walling exemption will remain in force under the new regulations. If it does, the industry would be amply protected. If it is considered superseded, the industry and its subcontractors would face a very serious situation.

As usual in such cases, nobody knows the answer. The proposed new regulations themselves say that "all regulations, and amendments thereof, promulgated prior to the effective date hereof are hereby revoked." The Walling letter was not a "regulation," nor an "amendment"—but the implication is not reassuring.

Opinions expressed by Labor Department officials are contradictory; some think the exemption will remain in effect; others doubt it. The industry, the military procurement agencies, and the nation as a whole may, therefore, do well to consider what effects may result if the aircraft industry should on July 1, 1952 find itself suddenly sub-

In Defence of the Realm

NUMBER 4 IN A SERIES



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About Subcontracting

Subcontracting, which the accompanying story shows would be destroyed under proposed regulations for the Walsh-Healey Act, is perhaps the most important single factor in the present mobilization program. The program centers about expanding the base for production, rather than immediately expanding production to war-sized proportions.

Subcontracting brings more firms into aviation manufacturing. A thousand firms can boost output a little and you get greater production faster than if a few firms tried to raise output a great deal. How extensive present subcontracting is can be gauged by these few examples:

- **Republic**—Uses 2,200 suppliers who produce 40% of the F-84.
- **Grumman**—About 50% of 1951 production was obtained from outside sources.
- **Lockheed**—Uses 5,000 subcontractors and suppliers who furnished as much as 51% of one plane Lockheed is building.
- **General Electric**—Uses 4,000 subs and suppliers in its jet engine work.

ject to the policing and liability provisions of the proposed Regulations.

What It Would Mean

Let us pick one of the smaller West Coast prime aircraft manufacturers, a company with 25,000 employes and 1951 sales of somewhat more than $100 million. To get the overall impact, this story would have to be multiplied nearly 30 fold—if that can be imagined.

Our manufacturer has today about 4,000 subcontractors, located in 42 different states.

After July 1, 1952 the government would insert in each new contract a stipulation (among others) that the contractor will notify all secondary contractors that the materials and articles contracted for are in fulfillment of a government contract subject to the Act.

► **Hog-Tied With Red Tape**—But this would only be the beginning. The prime contractor would have to investigate all of his 4,000 subcontractors, if he wants to keep doing business with them under future contracts, to find out if they are "auxiliary suppliers" under the regulations. If they are, they are not covered. But it is not easy to find out if any of our 4,000 subcontractors are exempt. Our manufacturer can't decide it himself.

He has to write 4,000 registered letters to the Administrator, "setting forth

a few words about alloy steels

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This could happen to you! A customer of ours was forced by restrictions and alloy shortages to switch from the Republic alloy steel he'd been using for years to one of the alternate alloys that he could get. He'd dreaded the problems of redesigning tools and dies, of revising heat-treating procedures, of heavy reject rates while the switch was being made.

But these troubles never came!

He called upon the Republic 3-Dimension Metallurgical Service . . . the Republic Field Metallurgist, backed up by the Republic Mill and Laboratory Metallurgists. These three men worked with the customer's metallurgist and his production foreman. Together, they analyzed his requirements, recommended the best available alternate steel, worked out the way to form the steel and heat-treat it.

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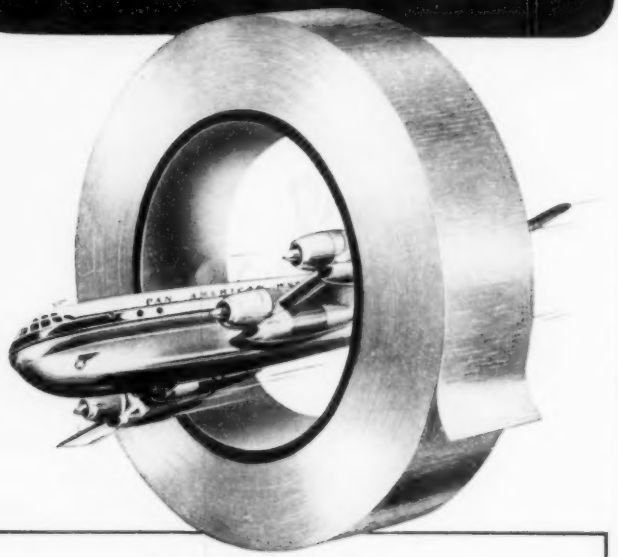

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the contract or contract bid number, the commodity called for by the contract, the work to be performed by the secondary manufacturer or supplier, and his understanding of what the regular practice is in the industry with respect to the specific commodity involved."

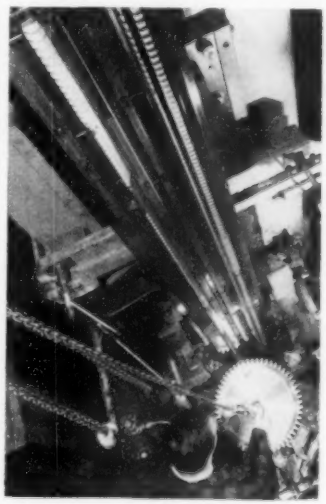
It is hard to see how our manufacturer could possibly do this without shifting a large percentage of its staff to composing letters. Yet, if he succeeds, the Administrator shall notify him within 15 days if the regular practice rule applies or not. If the Administrator is unable to do so within 15 days, "he shall so advise the inquirer and 'may' authorize him to consider the subcontractor not covered."

Let us now assume that half of the 4,000 subcontractors are thus considered "auxiliary suppliers" and not covered.

The real trouble will start only now with the 2,000 which are covered.

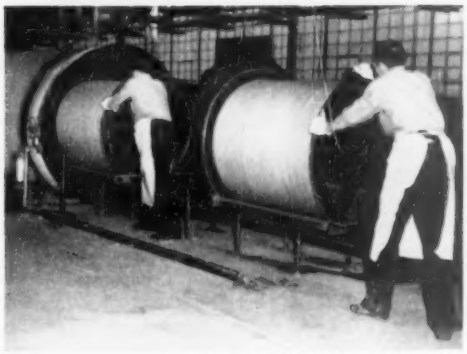
►**From Producer to Policeman**—First of all, the prime contractor will have to ask himself if he can possibly afford to deal with these subcontractors. He would have to police them; the regulations say specifically that "the contractor is charged with the duty of obtaining compliance."

Will he be able to send inspectors to 2,000 subcontractors in practically all states of the Union to check the books, to see that overtime regulations are followed, that no boy under 16 and no girl under 18 is employed, and that



BIG BROACH

This 14-ft.-high in-line broaching machine simultaneously cuts all the necessary triangular slots into a tough alloy-steel turbine disk for a Pratt & Whitney Turbo-Wasp jet engine at East Hartford, Conn. The turbine blades fit into the slots made in the disk.



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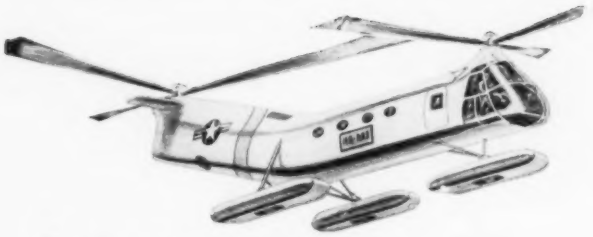

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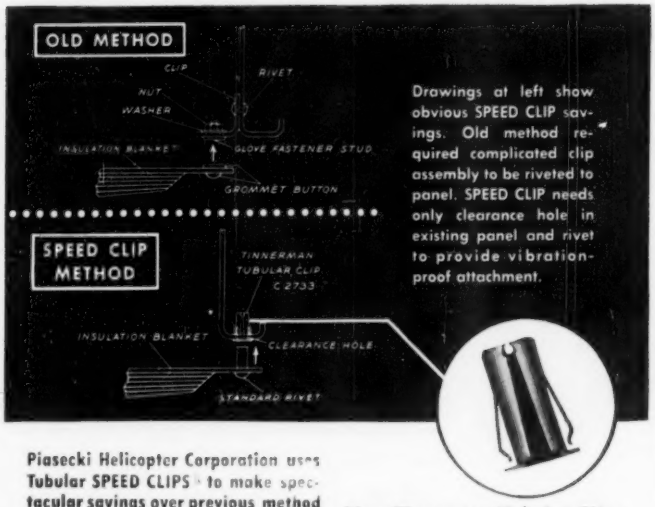
OLD METHOD
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working conditions are not unsanitary or hazardous or dangerous? Is he willing to assume the liability for any failure by any one of his 2,000 subcontractors to observe the requirements?

The answer is obvious—the enactment of these regulations and the subjection of our manufacturer to them would deal a death-blow to subcontracting. If our manufacturer is a good businessman, he will have to make every reasonable effort to curtail subcontracting to the minimum. The policing and liability provisions will force him to.

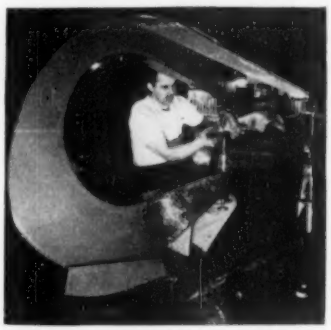
►**How to End Subcontracting**—But even if the prime did not do so, the subcontractor would probably withdraw from the field anyhow.

Many firms of good standing would probably refuse to let themselves be policed by large numbers of prime contractors. Others, who have been attracted to subcontracting for the aircraft industry upon the urging of the military or of the industry would be forced to withdraw because they could not or would not meet the requirement of the Act and of the aircraft determination. Their forced withdrawal from the aircraft picture would entail a heavy loss of investment for them—an investment made in good faith when they were asked to bid.

All told, the pressure on both the prime and the subcontractors would be to give up subcontracting—the exact opposite of the avowed aim of our defense mobilizers.

What Industry Can Do

Industry in general and the aircraft industry in particular are greatly disturbed by the proposed regulations. Several meetings have been held in Washington to discuss the implications of the new regulations and to plan what steps might be taken to prevent



SOLAR TRIMMER AT WORK

This "nibbler," a special machine designed and built by Solar Aircraft Co., San Diego, trims the edges of complicated steel shapes. Solar is making some of its special tools for British metal-working firms.

the more serious damages to industry.

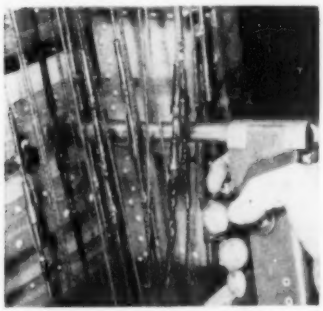
In the meetings called by the National Industrial Council and the Radio and Television Manufacturers Assn. it was brought out that the regulations alone gave only a general indication of what the Secretary of Labor wanted to do; that industry itself had to follow the instructions which would tell in detail just how the regulations would be applied; and that these instructions had not yet been issued.

► **No Pig in Poke**—Many of those present felt, therefore, that the Secretary should be asked to publish the proposed instructions first and then give industry sufficient time to study both the instructions and the regulations.

All those present agreed that the prime contractor should not be asked to police his subcontractors; and they also felt that he should not be held liable for their violations.

It is expected that many companies and trade associations in all fields will ask the Secretary of Labor to publish the proposed instructions and give industry time to comment on them.

The aircraft industry will undoubtedly follow a similar line. But, in addition, the aircraft industry will probably take steps to see that the military procurement agencies become aware of the threat to the existing relations between prime and subcontractor which might result from the proposed regulations. It



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DEALER'S NAME_____

AN3350-1 Leach No. 7064-238 SPST Contacts rated 50 Amps Resistive, Inductive and Motor Load @ 29 VDC. Continuous duty coil. Weight—.54 lbs.

AN3350-2 Leach No. 7064-758 Same as AN3350-1 except has inverted terminals and base mounting.

AN3370-1 Leach No. 7264-283 SPST Contacts rated 200 Amps Resistive and Motor and 100 Amps Inductive Load @ 29 VDC. Continuous duty coil. Weight—1.225 lbs.

AN3370-2 Leach No. 7264-570 Same as 3370-1 except has inverted terminals and base mounting.

AN3371-1 Leach No. 7264-332 SPST Contacts rated 200 Amps Resistive and Motor Load and 100 Amps Inductive @ 29 VDC Intermittent duty coil. Weight 1.225 lbs.

AN3371-2 Leach No. 7264-570-1 Same as AN3371-1 except has inverted terminals and base mounting.

AN3380-1 Leach No. 7401-C SPST Contacts rated 400 Amps Resistive and Motor Load and 100 Amps Inductive Load @ 29 VDC. Continuous duty coil. Weight 2.5 lbs.

AN3380-2 Leach No. 7401-CBU Same as AN3380-1 except has inverted terminals and base mounting.

AN3381-1 Leach No. 7401-I SPST Contacts rated 400 Amps Resistive and Motor and 100 Amps Inductive Load @ 29 VDC. Intermittent duty coil. Weight 2.5 lbs.

AN3381-2 Leach No. 7401-IBU Same as AN3381-1 except has inverted terminals and base mounting.

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Illustrated above are but a few of the *complete* line of *Leach* AN approved heavy duty contactors for aircraft.

Leach Relay Company can provide the aviation industry a wide selection of relays that not only meet, but surpass, the most stringent AN, AF and NAF requirements. If you have a difficult relay problem, an application where ordinary relays just won't do, it will pay you to contact *Leach*. For dependable performance, there's an unsurpassed *Leach* relay for every use in every type of aircraft.

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will probably also try to assure itself of continued protection under the Walling letter in case the proposed regulations actually do become effective.

Observers generally agree that at the present there is little chance to repeal the Walsh-Healey Act.

▶ **Changes Proposed**—But there is a move underway to amend the Walsh-Healey Act.

The proposed amendments would be as follows:

• **The concept of "locality"** would be interpreted according to the Bacon-Davis Act.

This would make the Secretary determine rates comparable to rates prevailing in the community instead of issuing one sweeping determination of one minimum rate applicable to the whole nation. Under this amendment minimum rates in Wichita could differ from those in Marietta or Los Angeles. Today aircraft companies in each of the three cities have the same $1.05 minimum.

• **The provisions** of the Walsh-Healey Act would not be applicable to goods usually sold on the open market.

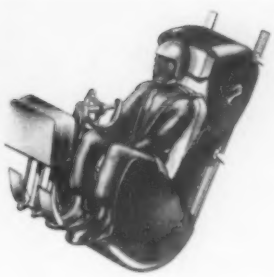
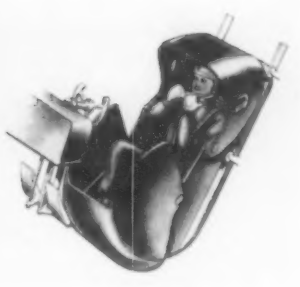
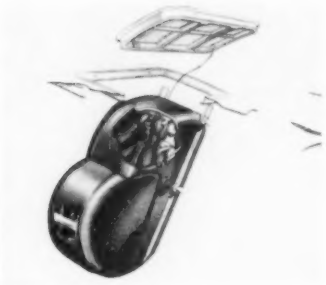
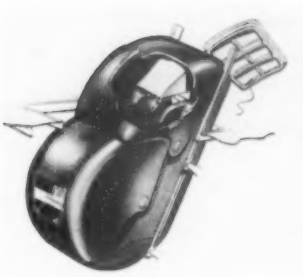
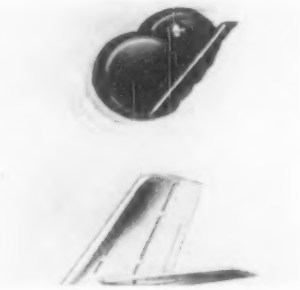
• **The administration** of the Walsh-Healey Act would have to conform to the requirements of the Administrative Procedures Act.

At the present time the Secretary of Labor can be completely arbitrary in the administration of the act. He can set any kind of a minimum without panel meetings or hearings of any kind. No legal action appears possible against any of his determinations. The proposed amendment would make him follow established procedures and would make court appeal possible.

The proposed regulations, bad as they may be, have had one good result. For the first time they have brought industry together to fight for changing the act and improving its administration.

"There's our dear little Agnes, taking all the credit as usual."

Aeroplane

Ejection Capsule Promises Happy Landing

Goodyear Aircraft Corp. has developed an ejectible seat capsule for use aboard multi-place Navy aircraft flying at speeds up to 1,200 mph. and at altitudes above 45,000 ft., the Bureau of Aeronautics has disclosed.

The capsule constructed of armor plating and Fiberglas skins and cores, is designed not only to protect the pilot or crewmen against supersonic airstreams and intense cold of the upper air but will also protect him from fire and flak while floating downward.

Present ejection seat equipment, Navy said, is satisfactory for speeds only up to 600 mph. and to altitudes up to 45,000 ft. The new unit is pressurized and contains oxygen equipment as well as a pararaft to increase the safety and comfort of the occupant.

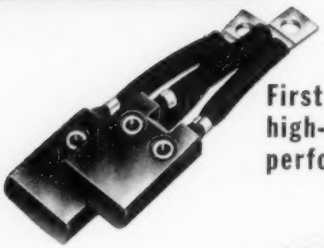
In operation during an emergency bail-out, the pilot or crewman places his feet on foot rests and pulls a pre-ejection handle which retracts the seat into the capsule. Clamshell doors of the capsule enclose him automatically within the capsule and simultaneously release the escape hatch of the plane.

The capsule catapult is fired when the occupant pulls a "head retention curtain" over his face. Following ejection, a special time-delay control device prevents parachute release until the capsule has slowed to a safe speed. The parachute, packed in a reefed condition, acts as stabilizer until a barometric control releases the reefing and permits the parachute to billow out and cushion descent.

Upon contact with the ground or sea, the parachute is automatically cut loose and the occupant can either jettison the doors and get out or remain inside until rescued. The capsule, Navy said, is not only seaworthy but is equipped with a heating unit for use in frigid areas.

The Goodyear project, Navy said, is not to be confused with another ejectible cockpit capsule under development for single-place fighter aircraft.

STACKPOLE
AVIATION *Brushes*



First in high-altitude performance!

MORE amperes per square inch!

Almost 10 years ago, Stackpole produced the first dependable, long-life high-altitude aviation generator brush. Instead of having to be replaced after 2 or 3 hours flying at 30,000 feet, these famous brushes operated dependably for hundreds of hours!

Today, with altitudes of 50,000 feet or higher, and higher rotating speeds, Stackpole brush engineering continues to pace the progress in this essential phase of aviation development. Stackpole brushes handle current densities as high as 150 to 200 amperes per square inch on generators, inverters and other equipment—with many successful intermittent-duty applications of 500 amperes per square inch.

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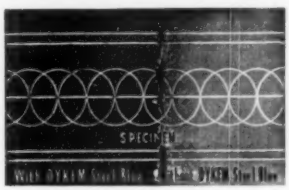
Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.



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THE DYKEM COMPANY 2303A North 11th St. St. Louis 6, Mo.

Fast Write-Offs for Defense Expansion

The government has restarted its program of accelerated tax amortization for manufacturers expanding their defense facilities. The issuance of certificates of necessity for this purpose was resumed Dec. 3, after having been suspended Aug. 18. AVIATION WEEK published previous aircraft industry certificates for the period Oct. 30, 1950 to Aug. 18, 1951 in its issue of Sept. 24, 1951, pp. 137-150. New certificates will be published as they are received.

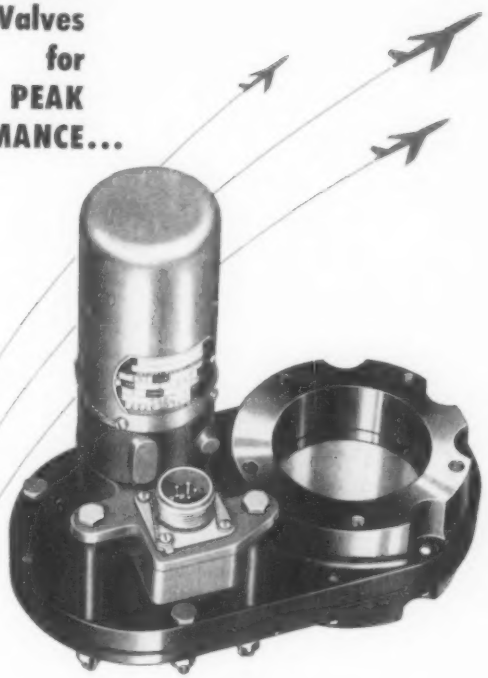
Company name is given, followed by product or service, cost of construction deemed necessary for defense expansion but of no likely civilian use after the emergency, and the percentage of the expansion cost allowed for fast tax write-off. Fast write-off permits property to be depreciated in five years, rather than 20-25 years.

- **Consolidated Industries, Inc.**, West Cheshire, Conn., aluminum aircraft forgings, **$60,554, 65%.**
- **Hershey Metal Prod., Inc.**, Ansonia, Conn., aircraft parts, $153,800, 50%.
- **Hartford Machine Screw Co.**, Windsor, Conn., aircraft parts, $116,965, 65%; $24,331, 85%.
- **Packer Machine Co.**, Wallingford, Conn., machine tools for aircraft, $356,280, 70%.
- **Lincoln Tool & Machine Co.**, Watertown, Mass., aircraft parts, $95,000, 65%.
- **Hartford Tool and Die Co.**, West Hartford, Conn., parts for aircraft engines, $200,000, 65%.
- **New England Machine Works, Inc.**, Waterbury, Conn., aircraft engine parts, $49,578, 80%.
- **Hartford Tool and Die Co.**, Hartford, Conn., aircraft parts, $36,980, 70%.
- **Oneida, Ltd.**, Sherrill, N. Y., aircraft parts, $1,234,329, 65%.
- **Bendix Aviation Corp.**, Teterboro, N. J., aircraft parts, $444,365, 65%; $207,361, 65%.
- **Bendix Aviation Corp.**, Utica, N. Y., accessories and instr., $2,627,008, 65%.
- **Bendix Aviation Corp.**, Long Branch, N. J., aircraft parts, $196,605, 65%.
- **Walter Kidde and Co., Inc.**, Belleville, N. J., ordnance and aircraft, $458,594, 60%.
- **Research Tool and Die Co.**, Burlington County, N. J., aircraft parts, $12,206, 80%.
- **Bell Aircraft Corp.**, Wheatfield, N. Y., aircraft parts, $81,291, 65%.
- **Thermo Electric Co., Inc.**, Fair Lawn, N. J., aircraft parts, $75,000, 70%.
- **The Sperry Corp.**, Great Neck, N. Y., electronics, $1,792,335, 65%.
- **The Sperry Corp.**, Long Island City, N. Y., electronic equipment, $214,328, 65%.
- **The Sperry Corp.**, Long Island City, N. Y., ordnance, $1,013,198, 65%.
- **The Sperry Corp.**, Nassau, N. Y., scientific precision instruments, $231,296, 65%.
- **The Sperry Corp.**, Great Neck, N. Y., aircraft parts, $892,860, 65%.
- **The Sperry Corp.**, Great Neck, N. Y., scientific precision instruments, $1,391,703, 65%; $2,456,005, 65%.
- **General Motors Corp.**, Lockport, N. Y., aircraft parts, $3,575,000, 65%.
- **General Motors Corp.**, Rochester, N. Y., aircraft parts, $6,878,984, 65%.
- **General Motors Corp.**, Syracuse, N. Y., aircraft parts, $5,335,000, 65%.
- **Burndy Engineering Co., Inc.**, New York, N. Y., aircraft parts, $234,050, 70%.
- **Jasco Aluminum Products Corp.**, New Hyde Park, L. I., N. Y., aircraft parts, $294,000, 50%.
- **Wright Aeronautical Corp.**, Wood-Ridge, N. J., aircraft parts, $94,793, 65%.

- **Utica Drop Forge and Tool Corp.**, Yorkville, N. Y., aircraft parts, $46,710, 75%.
- **American Aluminum Ware Co.**, Union Township, N. J., aircraft parts, $804,489, 55%.
- **Rheem Manufacturing Co.**, Linden, N. J., ordnance, $719,629, 65%.
- **Republic Aviation Corp.**, Long Island, N. Y., aircraft parts, $800,000, 65%.
- **Grumman Aircraft Engineering Corp.**, Bethpage, L. I., N. Y., military aircraft, $350,000, 65%.
- **Reaction Motors, Inc.**, Rockaway, N. J., engineering service, $30,637, 65%.
- **Curtiss-Wright Corp.**, Caldwell, N. J., aircraft propellers, $75,688, 65%.
- **Curtiss-Wright Corp.**, Carlstadt-East Rutherford, N. J., flight trainers, $2,180,351, 35%; $34,512, 65%.
- **Daco Machine and Tool Co.**, Brooklyn, N. Y., aircraft carburetors, $10,707, 80%.
- **American Airlines, Inc.**, New York, N. Y., aircraft, $2,604,554, 80%.
- **C. B. Kaupp and Son**, Maplewood, N. J., aircraft parts, $40,299, 75%.
- **Eton Machine Co., Inc.**, Farmingdale, N. Y., aircraft parts, $17,265, 80%.
- **Kennametal, Inc.**, Latrobe, Pa., aircraft parts, $395,800, 65%.
- **Thompson Products, Inc.**, Danville, Pa., aircraft parts, $1,065,000, 65%.
- **W. H. Reisner Mfg. Co., Inc.**, Hagerstown, Md., aircraft equipment, $141,319, 70%.
- **Wright Machinery Co.**, Durham, N. C., aircraft parts, $244,913, 65%.
- **Bendix Aviation Corp.**, Towson, Md., electronic equipment, $97,910, 65%.
- **Smith-Morris Co.**, Ferndale, Mich., aircraft parts, $192,786, 70%.
- **Yard-Man, Inc.**, Jackson, Mich., aircraft engine parts, $135,745, 80%.
- **Rohm and Haas Co.**, Knoxville, Tenn., aircraft products, $311,849, 50%.
- **General Motors Corp.**, Flint, Mich., aircraft parts, $119,603, 65%.
- **General Motors Corp.**, Montgomery Cty., Ohio, aircraft equipment, $7,016,573, 65%.
- **General Motors Corp.**, Vandalia, Ohio, aircraft parts, $1,547,047, 65%.
- **Canton Drop Forging and Mfg.**, Canton, Ohio, forgings for aircraft, $407,000, 65%.
- **Aeroquip Corp.**, Jackson, Mich., aircraft parts, $189,890, 65%.
- **Borg-Warner Corp.**, Wooster, Ohio, aircraft parts, $1,399,499, 65%.
- **Goodyear Aircraft Corp.**, Akron, Ohio, aircraft research and development, $789,685, 65%.
- **Detroit Harvester Co.**, Detroit, Mich., aircraft engine parts, $201,414, 75%.
- **Aircraft Precision Products Inc.**, Detroit, Mich., aircraft parts, $18,344, 80%.
- **Ex-Cell-O Corp.**, Lima, Ohio, aircraft parts, $2,100,000, 65%.
- **Ex-Cell-O Corp.**, Highland Park, Mich., aircraft parts, $316,471, 65%.
- **Jack and Heintz Precision Instruments**, Maple Height, Ohio, aircraft equipment, $99,215, 65%.
- **Aluminum Company of America**, Cleveland, Ohio, forgings for aircraft, $660,000, 65%; $1,120,500, 65%.
- **Joy Manufacturing Co.**, New Philadelphia, Ohio, aircraft parts, $122,740, 65%.
- **Piqua Engineering, Inc.**, Piqua, Ohio, aircraft parts, $28,000, 40%.
- **Cyril Bath Co.**, Cleveland, Ohio, aircraft parts, $12,866, 80%; $34,267, 80%; $17,167, 80%.
- **Denison Engineering Co.**, Columbus, Ohio, aircraft testing equipment, $303,275, 70%.
- **Universal Engineering Co.**, Bad Axe, Mich., aircraft parts, $156,132, 70%.
- **Bendix Aviation Corp.**, Hamilton, Ohio, aircraft parts, $996,417, 65%.
- **Ford Motor Co.**, Ypsilanti, Mich., aircraft parts, $6,018,354, 65%.
- **Sterling Electric Motors, Inc.**, Van Wert, Ohio, aircraft parts, $935,010, 70%.
- **Borg-Warner Corp.**, Bedford, Ohio, aircraft products, $890,841, 50%.
- **Lamson and Sessions Co.**, Cleveland, Ohio, aircraft accessories, $74,400, 50%.
- **Shamrock Tool and Die Co.**, Cleveland, Ohio, tooling for aircraft component production, $8,358, 80%.
- **Detroit Magnesium & Aluminum Casting Co., Detroit, Mich.**, aircraft engine castings, $26,525, 65%.
- **Harris-Seybold Co.**, Cleveland, Ohio, aircraft parts, $624,948, 65%.

TRANSCO

Aircraft Valves for PEAK PERFORMANCE...



Illustrated is TRANSCO'S Model 2520-2 Motor-Actuated Shut-off Valve — one of many types and designs available for aircraft application.

TRANSCO Valves incorporate flight-proven, time-tested features which have been pioneered and perfected through years of specialized experience in the manufacture of aircraft valves. These features, combined with extremely compact, lightweight construction, contribute to their superior operating performance.

TRANSCO engineers are thoroughly experienced in aircraft valve design and application and stand ready to assist you on any valve design, installation, servicing or replacement problems. TRANSCO valves provide leakproof closure, smoothness of operation, easy installation, better performance, lower maintenance and longer life. These are the benefits you get by linking the economics of proven design to your specific requirements.

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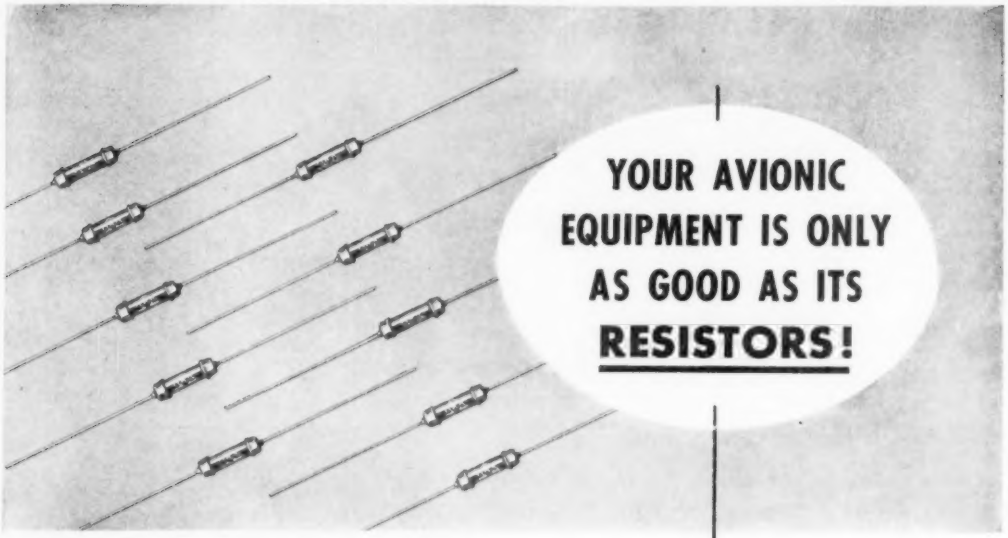

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Of all the components that make up avionic equipment, resistors are among the most important. Yet, because they are insignificant in size and price, this importance is too often overlooked.

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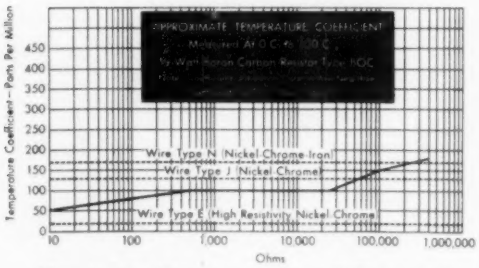
Largest manufacturer of resistors in the world, we have the modern equipment and engineering staff to make testing a *continuous* job. *Test data* guide us in producing the widest line of resistors in the industry. And *test data* help us take the lead in pioneering new developments—many for aircraft and guided missiles.

For instance, one of three new products soon to be made available for avionic equipment:—

The New IRC Type BOC Boron-Carbon PRECISTOR



Here is the ultimate in stable, reliable non-wire wound units. Exposed to a temperature of 65°C. for one hour, newly developed BOC shows a resistance change of less than .2%. This is four times the resistance to heat required in aircraft and guided missiles!

Rated at ½ watt, Type BOC meets the most critical circuitry needs—conforms to all requirements of MIL-R-10509. Voltage coefficient is less than 20 parts per million per volt. Load life is extraordinary; on a 500-hour test at ambient temperature of 40°C., resistance change will not exceed 2%.

Test data and complete information on these new Type BOC Boron-Carbon PRECISTORS are yours without obligation. Write today for Catalog Data Bulletin B-6. It belongs in your file. Address Dept. F.

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AVIONICS

Pilots Back Approach Couplers

- **IAS speakers say all-weather operations possible with devices and techniques now in existence.**
- **And automatic approaches through hook-up between ILS and autopilot is one of the keys.**

By Philip Klass

Most of the devices and techniques necessary to improve all-weather operations are in existence today and need only to be standardized, improved, evaluated, or just plain adopted.

This was the consensus of an 11-man panel of experts participating in a symposium on All-Weather Operation Problems at the recent annual convention of the Institute of the Aeronautical Sciences in New York City.

The panel didn't dwell on the prospect of all-weather flight in the literal sense of the word. They did discuss means of improving what might better be termed "most-weather operations."

However, in a paper presented earlier, Capt. James Anast of the USAF's All-Weather Flying Division said that it is "now possible to control aircraft automatically in all weather conditions except for actual takoff and landing." And he later made reference to autopilot flare-out couplers which will permit automatic landings.

It was generally agreed that major improvement would come from the adoption of:

- Automatic approach couplers for autopilots.
- Improved approach and airport lighting.
- Improved automatic or semi-automatic handling of air traffic.
- Airborne radar beacons for improved ground radar reception and positive aircraft identification.

▶ **No Solution**—A problem which was much discussed without recommendations for a cure was that of tower-quoted ceilings and visibilities which often don't jibe with what the pilot actually finds during his approach. Ceilings and visibilities may be considerably better or worse than reported.

The condition was generally attributed to Weather Bureau reports which don't keep pace with rapidly changing conditions, and to the fact that the pilot's slant visibility at approach altitude may differ considerably from ground-based observations.

Considering the wide divergence of interests represented on the panel (Air Force, Navy, CAA, airline pilots, airline management, airport operators, equipment manufacturers, and corporation aircraft owners) there was surprisingly little sharp difference of opinion among panel members. Capt. L. V. Berkner, USNR, president of Associated Universities, Inc., served as panel moderator.

▶ **Other Suggestions**—The most all-inclusive program for improvement was a ten-point one proposed by Capt. E. A. Cutrell, American Airlines pilot. In addition to those previously cited, Cutrell suggested:

- Equipping two airport runways for ILS/GCA approaches from opposite directions.
- Wider use of freight and non-passenger flights to gain experience and perfect techniques at ceilings lower than 200 ft.
- New hangar combination passenger-loading-ramp designs to permit sheltering the plane from the elements while on the ground.
- Standardized cockpit instrument layout, controls, and lighting.
- Improved and simplified cockpit techniques for all-weather operations.
- Use of Fido (fog burn-off) equipment at a few high-density airports.
- Establishing a working field group in the Air Coordinating Committee to closely follow all-weather developments and techniques in military, commercial and equipment fields.

▶ **Auto-Approach Couplers**—The percentage of initially missed all-weather approaches could be greatly reduced if aircraft were equipped with autopilots and automatic approach couplers. (The auto-approach coupler converts signals from ILS receivers into signals which cause the autopilot to fly the airplane down the ILS beams.) This was the opinion of Robert Roe, head of flight operations for Sperry Gyroscope Co., one of the pioneers in this field.

Roe urged that efforts be devoted to reducing missed approaches at ceilings above 200 ft., instead of worrying about operations at lower ceilings. He felt that this would pay bigger dividends, in terms of improved all-weather operation.

To prove his point, Roe presented data obtained from a joint CAA-Sperry analysis of records of more than 13,000 pilot-flown straight-in ILS approaches in the No. 1 CAA Region (Boston, New York, Washington, Richmond, etc.) over a two-year period (AVIATION WEEK Dec. 24, 1951, p. 56).

▶ **Missed Approaches**—10% of the DC-4s missed their first approach under 500-ft. ceiling, 1 mile visibility conditions. The percentage of DC-4 misses went up to 25% for 500 ft., ½ mile; and up to 30% at 400 ft., ½ mile.

Using auto-approach couplers, Sperry believes that the misses could be cut to 5% or less. They base this on more than 100 documented approaches they have made in a test plane equipped with an autopilot and coupler. All flights have been made with ceilings of less than 100 feet.

▶ **TCA Confirms**—Later, in a statement from the floor, Mr. Ron Baker, chief test pilot for Trans-Canada Airlines at Montreal voiced similar enthusiasm for auto-approach couplers. TCA has conducted tests of their own, using a North Star. These tests indicate that automatic approaches can be made more safely with a 100-ft. ceiling than can pilot-flown approaches with a 200-ft. ceiling, according to Baker. (TCA is believed to have made the tests with an Eclipse-Pioneer autopilot and coupler.)

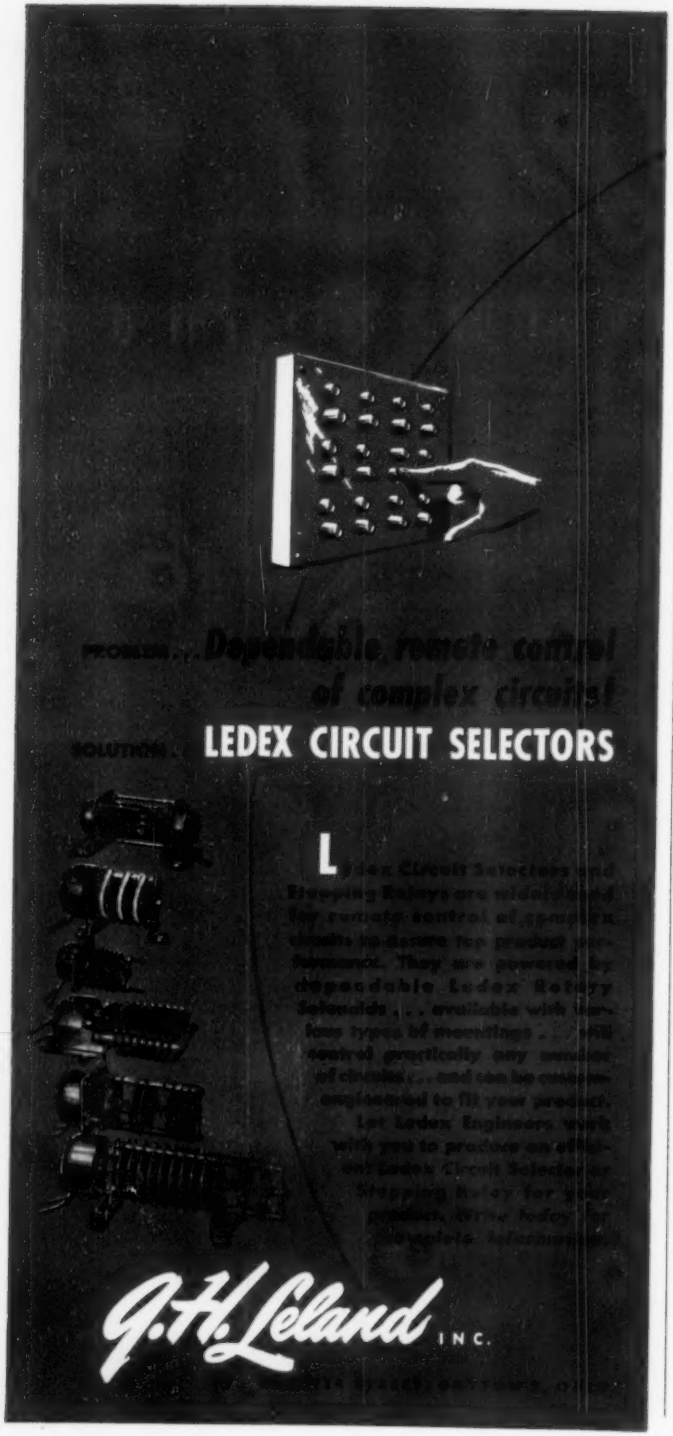
Baker did state that their tests indicated that the ILS beam was not at present satisfactory below 100 ft.

Earlier, in a paper presented before the convention, Capt. Anast had shown the results of tests conducted by the USAF which confirmed the marked superiority of automatic approaches over manually flown approaches.

Considering his previous statements on the merits of auto-approach couplers, Roe's concluding remarks came as a surprise. He stated that he didn't feel that ceilings should be lowered below 200 ft. even with automatic couplers. He felt that the pilot should always retain enough altitude to permit a safe pull-up and go-around if necessary. Nor did Roe see the economic justification of automatic landing (flare-out) couplers for airline operations, although the military can justify its use.

▶ **Challenge**—Panel member John F. Gill, chief pilot for Eastern Air Lines took issue with Roe's figures on missed DC-4 approaches. Gill thought that EAL's experience with DC-4s at Newark had been better than indicated by Roe's figures. Gill suspected that the figures included airports not equipped with adequate approach lighting. Gill also questioned whether the officially quoted ceilings were actual ceilings.

Gill suggested the possibility of using



only the localizer portion of the automatic coupler, allowing the pilot to retain control of vertical descent. He felt that the localizer problem, particularly in a strong cross-wind, was the most taxing on the pilot.

► **Improved Lighting**—Gill called for standardizing and adopting at once an improved system of approach and airport lighting. The system which Gill recommended is that recommended by the International Air Transport Assn.'s Flight Technical Committee (AVIATION WEEK Nov. 26, 1951, p. 69). The system uses centerline, condenser-discharge, bar-type aproach lighting. One thousand feet from the beginning of the runway, 5-bar-type white approach lights would be grouped. (At this point, the plane should be at 100 ft. altitude.) Threshold eminence lights, equipped with red filters, would be placed 200 ft. and 100 ft. prior to runway threshold, with distinguishing groupings. The actual threshold lights would be green, and arranged in an L-shape to bracket the beginning of the runway. Improved lighting to outline the runway clearly was needed to complete the system, Gill said.

► **ILS-VOR Troubles**—"Don't count on the flag warning in ILS and VOR cockpit indicator to show up all types of transmitter and receiver malfunctions," was the warning of E. A. Post, superintendent of navigational aids for United Air Lines. He urged pilots to use their other panel instruments and radio aids to double-check their VOR and ILS.

ILS and VOR monitors are "pretty good" at spotting malfunctions of ground transmitters, according to A. E. Jenks, chief, flight inspection division of the CAA Office of Federal Airways. He pointed out that 360 monitors would be required at each VOR station if a continuous monitor of all its course signals were made. Then, to be perfectly sure, each monitor would have to have its own monitor, ad infinitum. Jenks felt that a reasonable compromise is necessary. Present VOR stations each have monitors on two of the course signals.

► **Precision Radar**—The use of precision approach radar (PAR) will permit greatly improved handling of all-weather operations, including more orderly scheduling of aircraft and reduced separation between planes at the same altitude. This was the view expressed by Sam Saint, director of the Air Transport Assn.'s Air Navigation Technical Committee.

Saint stressed the advantages of using airborne transpounding radar beacons (AVIATION WEEK Feb. 4, 1952, p. 63) to provide improved ground scope clarity during heavy precipitation and to permit aircraft identification. Where ground radar must depend upon its own

reflected signal for intelligence, the equipment is sometimes ineffective in bad weather when it is most needed.

Saint felt that the horse-and-buggy communication techniques between traffic controllers need improvement, particularly during all-weather operations at high-density airports.

▶ **Airport Problems**—Airport operators may be reluctant to invest in new all-weather aids because of past experience. In some cases, heavy investment in airport improvement has been quickly obsolcted by a "flip-flop" in accepted practice, Claude King, deputy commissioner of Cleveland airport, warned; also, reduced federal funds for airport expansion had proven embarrassing to operators who got municipal funds with the understanding they would be matched.

King indicated that the operators might be expected to finance threshold and runway lighting, but that new approach lighting should be considered part of the federal airways.

▶ **Standardized Cockpits**—The considerable talk and study of standardized airliner instrument panels for improved all-weather operations may soon be converted to action, but only for new aircraft.

According to panel member M. G. (Dan) Beard, chief engineer of American Airlines, the SAE Committee S-7 on Cockpit Standardization will either accept a CAB-proposed layout of the flight instrument group this month, or will propose an alternate layout acceptable to the airline industry.

The CAB layout is based on a Munitions Board standard developed for military aircraft. While originally proposing that the standard should be retroactive to existing airliners, CAB backed down when the airlines indicated that such a move might adversely affect safety in all-weather operations until their pilots became used to the new layout. The cost of such a retrofit program was also an objection.

▶ **Not Easy**—Beard said the S-7 committee's job is made harder by the existence of the Sperry Zero Reader and Collins Course Line Indicator. Since these new instruments are not widely used in the industry at present, the standard panel cannot be drawn up around them. Yet failure to make provision for them might soon obsolete any standard panel adopted.

▶ **Questions and Answers**—Answers to questions from the floor brought out the following:

- Gill wasn't enthusiastic about the prospects of using Fido techniques to clear out airport area fog, based on tests at Arcata.
- Panel Moderator Berkner expressed the hope that basic knowledge gained from current rain-making programs might give a solution to the fog clearance problem.
- Saint stated emphatically that ILS and GCA when used together are several times safer than either of them used alone. He decried attempts to show that either one by itself was superior to the other.
- Post felt that aircraft should be equipped with two separate VOR receivers or one VOR and one ADF receiver before attempts are made to use lateral separation along the airways of aircraft at the same altitude. The "doubling up" on receivers was suggested as a precautionary measure.

Other members of the IAS Panel included Cole H. Morrow, chairman of the board of Corporation Aircraft Owners Assn., and Capt. L. F. Dodson, Naval Operations.

Cold-Cathode Control Easy to Trigger

A new small electronic pilot-relay control which uses a cold-cathode type of tube and can be actuated by as little as 2 microamps has been announced by the Haledy Electronics Co.

The device consists of the cold-cathode tube and a relay, powered by the tube, and associated circuitry. The manufacturer expects the device will

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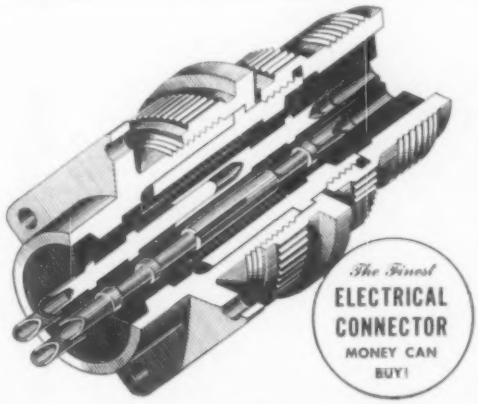

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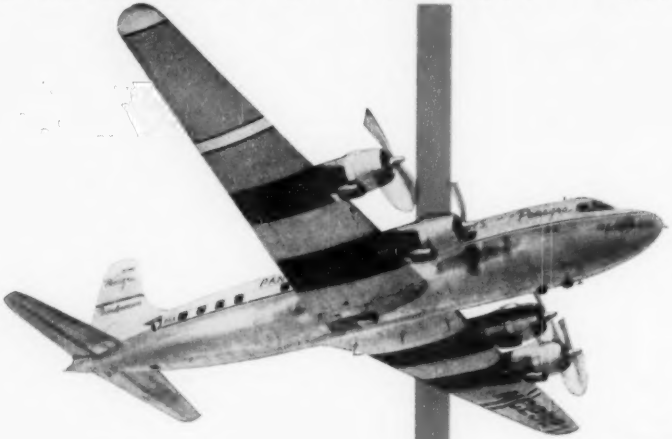

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De luxe DC-6 planes on Panagra's El Inter-Americano service to South America now carry Monsanto Skydrol in their supercharger systems. Panagra's new DC-6B's will have Skydrol in their hydraulic systems as well as in the superchargers.

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Photo courtesy Panagra (Pan American-Grace Airways, Inc.)

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find many applications because the input signal impedance can vary between a dead short and 10 megohms without affecting its operation.

Advantages claimed by the manufacturer include long life under rugged usage, and instantaneous operation without warm-up. Both are attributed to the use of the new cold-cathode tube.

Although designed for use with 60-cycle power, the manufacturer says the device will operate equally well on 400-cycle power, between −50C and 75C.

Haledy Electronics Co., 57 William St., New York.

Germanium Means Smaller Rectifiers

A new line of small germanium rectifiers which are about 1/35 the size of selenium-type rectifiers of the same rating, according to General Electric, is in production by their Lighting and Rectifier Dept. The new germanium rectifier occupies about 10 cu. in. per kw. of output capacity.

The smaller size is possible because of the higher current densities at which germanium cells can be operated. Except for inherent temperature limitations, their size should make the rectifiers attractive for use in avionic equipment, particularly with magnetic amplifiers which require considerable rectifier capacity. For maximum life, GE says that cell temperatures shouldn't exceed 60C.

The new units are being produced in single phase, half-wave ratings of 12 v., 21 v., and 27 v., all with 0.4 amp. capacity. Another 6 v./6 amp. unit is also available.

GE says the new rectifiers have a high efficiency, with voltage regulation of less than 5%. As with other metallic rectifiers, the new devices are temperature sensitive, with both reverse resistance and forward resistance increasing as temperature decreases.

The temperature-resistance variations of the new germanium rectifiers are not disclosed by GE.

According to General Electric, tests of the new rectifiers at rated voltage shows no change of forward or back resistance in 5,000 hr. of operations.

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AA Revives Its Airborne Radar Plans

- **Purchase of units would aid navigation now.**
- **And experience will be invaluable in jet era.**

By George L. Christian

Commercial jet aircraft will have to carry airborne radar, says M. G. Beard, chief engineer of American Airlines. Not only will radar improve the safety factor, but it will enable transports to avoid unfavorable weather. Jet transports will not be able to barrel into thunderstorms at 600 mph, flinging passengers and baggage around the cabin. Nor will they be able to afford to throttle back for any appreciable length of time, because of the vast quantities of fuel jets gulp. The alternative? See the thunderstorms on radar and fly around them, or through them avoiding the turbulent cores, according to Beard.

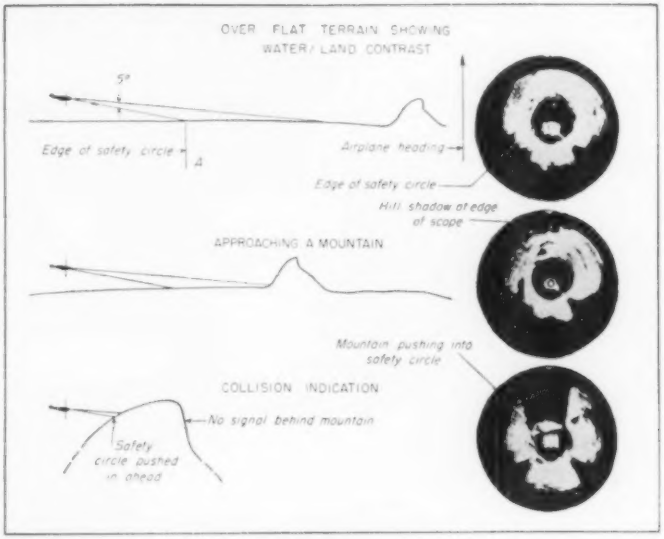
► **Plan Reborn**—American, pioneer commercial U. S. investigator and tester of airborne radar, is now reviving its five-year old plan to install radar on all of its aircraft. This may cost over $3.3-million, Beard says. (AA had plans in 1947-48 to install ASP-10 type radar, but the $2.5-million tab was too steep for a carrier that was then losing money.)

A basic motive behind AA's present airborne radar emphasis is to have ready a practical, lightweight set by the time commercial jets dominate the skies—a set with which pilots, engineers and mechanics are intimately familiar and in which all have faith.

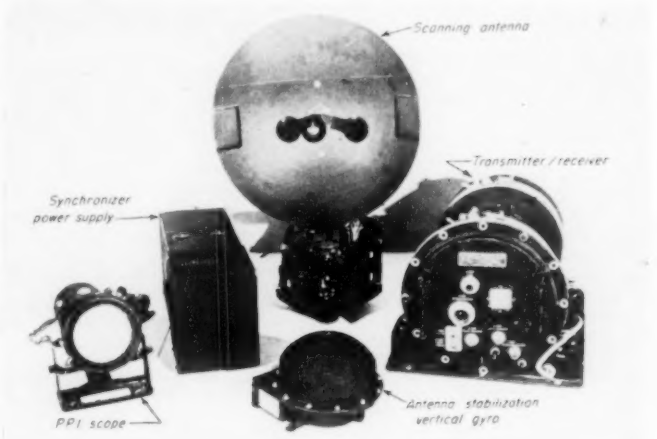
The equipment will have to be at least as reliable as today's aircraft radio, Beard said, and its purchase price, in volume, will have to be within the reach of all major airlines and most of the minor ones.

► **Justified Now**—Beard stressed his belief that installation now of airborne radar on current, piston-engine aircraft can be justified as a weather surveillance device alone. The passenger comfort obtained by avoiding turbulent air detected by the radar will more than offset the cost and weight of installation says Beard, if those two factors are within reason. And avoidance of hail damage, which can run to $200,000 a winter, is an added inducement. Then throw in the added potentials of radar-increased safety, because of being able to spot mountains en route; and operation as an adjunct to existing navigation and instrument landing equipment so that more than one runway may be used as an instrument landing strip. When you've done this, Beard feels, there can no longer be any doubt that not only is airborne radar practical, but essential.

Beard says that the exhaustive flight



AIRBORNE radar picks up a mountain. Top: safety circle shows clear view. Center: mountain shows up in upper part of scope. Bottom: mountain's intrusion into safety circle shows imminent collision. Pictures taken from belly-mounted radar.



SOME of modified APS-10 airborne radar equipment used by AA during tests.

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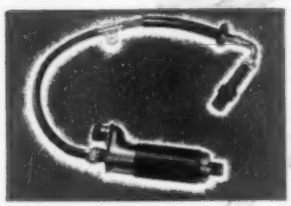

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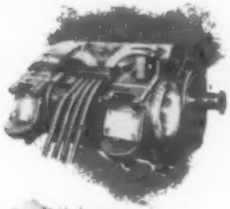

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HAIL damage to Flagship might have been avoided if plane had been radar equipped.

tests conducted by American (partly under a Navy contract) has proved that the equipment positively identifies the turbulent cores of thunderstorms. Pilots can avoid these rough areas without difficulty, giving their passengers a smoother ride while avoiding the excessive plane stresses so often built up in thunderheads.

To underline his opinion, Beard quoted Col. Francis L. Williams, pilot of the President's Independence (equipped with a modified APS-10 radar) as saying he had never given a passenger a rough ride except once—and that was when the set temporarily failed to function.

American spokesmen said that other large U.S. carriers have indicated their willingness to go along with AA in investigating actively the possibility of obtaining suitable equipment. And the Air Transport Assn. is actively supporting the move (AVIATION WEEK Mar. 24, p. 15), having notified radar manufacturers of current airline interest in such avionic equipment.

▶ **What's Wanted**—These are some of the radar's criteria as sketched by American officials.

• **Weight.** AA wants to get the set's weight down to 100 lb. or less. It feels this is a reasonable expectation because of current rapid strides in the art of tube miniaturization and general shrinkage of avionic equipment components. Importance of the weight aspect is pointed up by Beard's statement that "on the Convair, the radar's weight will come straight out of payload—and that's worth $25/lb./aircraft/yr. on a 65% payload factor basis."

• **Cost.** Price tag on the sets were optimistically set at $4-6,000. This was later revised upward to $6-8,000. Installation engineering and cost was estimated at $3-4,000.

• **Size.** While no definite limits were established for the set, officials said that it would have to fit comfortably into the nose section of a Convair 240. Maximum scanner size would be 15-18 in. diameter.

• **Stabilization.** Radar sets will have to be gyro-stabilized in both the pitch and roll axes. Pitch stabilization is important to avoid "ground clutter" on the scope when the aircraft noses down.

• **Quantity.** To get the sets' price down as low as possible, a husky order for as many sets as possible should be placed. If most U.S. airlines participate in the program, the number could easily reach 1,000 to 1,200 units, plus spares, according to AA.

American spokesmen did not reveal who might construct the sets, but indicated that two or three manufacturers had indicated their willingness to consider the matter.

▶ **Easy Reading**—American officials did not express any concern about one facet of airborne radar about which considerable controversy has existed for some time, namely rapid and correct interpretation of the images appearing on the radar scope.

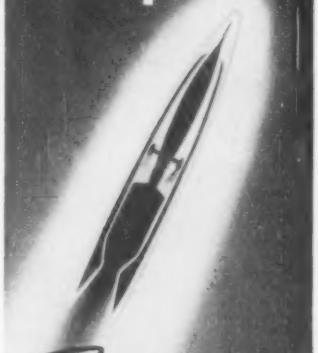
AA's investigations of rapidity of interpretation were summed up this way: Several pilots who had never flown radar or even seen it before, were briefed on what to do, shown the scope, then put into a blind flying cockpit. The planes were taken to mountainous areas and put on collision courses. "Seldom did a pilot take more than 10 sec. to take correct evasive action." Rarely did any pilot complain about interpretation difficulties.

▶ **Present Status**—Because of the size of the total bill and the current reluctance of manufacturers to offer attractive performance guarantees for their sets, American will go into the program slowly and cautiously. Probable course will be to purchase several prototype sets and establish a thorough and comprehensive evaluation program.

On an extensive tour of major airline headquarters a few months ago, this reporter found an almost unanimous apathy on the part of high airline officials towards installing airborne radar.

Most of the lack of interest revolved around three points: acceptable equipment was not on the market; radar as such, had not reached the degree of reliability required by the airlines; and if suitable equipment were available, how useful would it be—would a pilot be looking at it at the right time to avoid storms or mountains, and would he be able to interpret and believe what he saw? American's move should do much to warm this

marquardt



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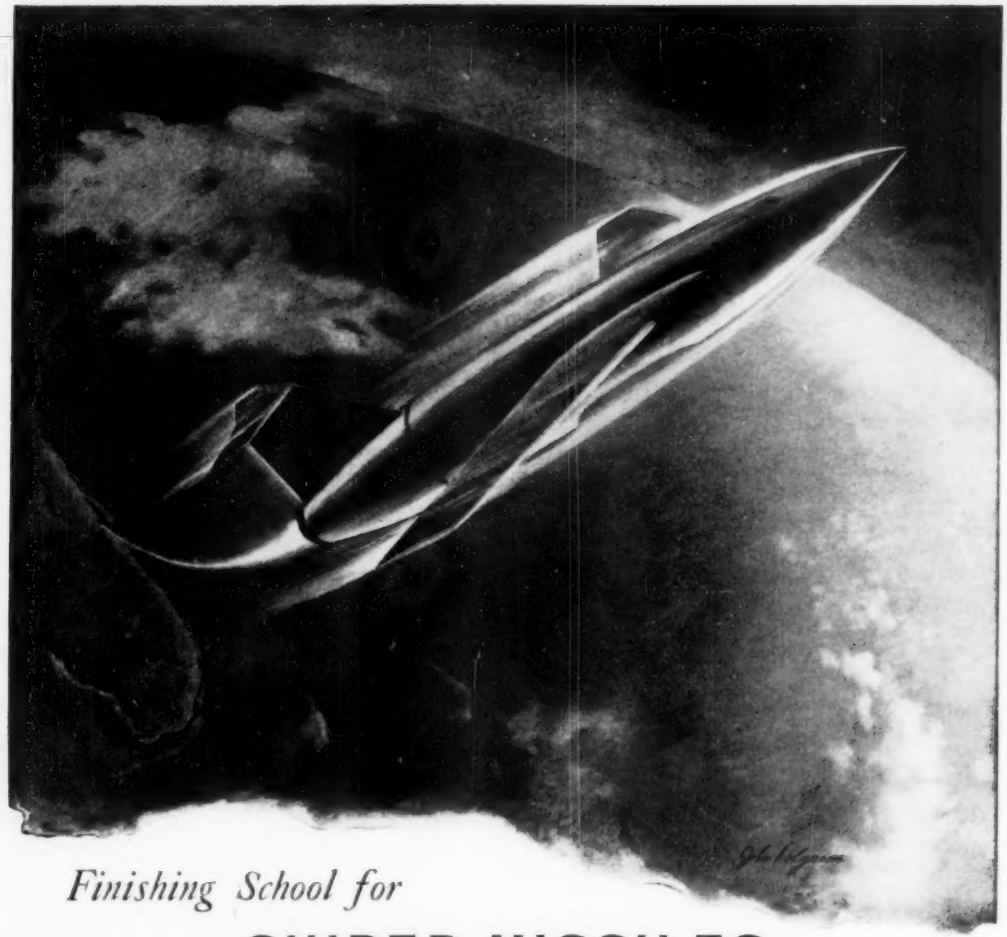

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Operated by the USAF's Air Research and Development Command, the Missile Test Center is geared up to test the wide variety of missiles, rockets and pilotless aircraft vital to modern air power. It reached its full stature with the recent completion of down-range observation stations. And the dramatic B-61 pilotless bomber, the Matador, designed and produced by Martin as part of its diversified missiles program, was the first to use the completed range. THE GLENN L. MARTIN COMPANY, Baltimore 3, Maryland.

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Illustration is artist's conception of Air Force B-61 Matador pilotless bomber.

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Hail Trouble

Building radomes for installation on nose or belly of highspeed aircraft is not easy, according to American Airlines. The carrier has done much pioneering work in airborne radar.

The radomes have to be hail-resistant. For hail can mean trouble for the lightweight structure. Moreover, they have to keep attenuation as low as possible. Reflection and refraction must also be held to minimum levels, which is difficult because the angle of wave impingement varies greatly. But, unless these obstructions are all but eliminated, azimuth readings will be affected.

AA engineers say that the best material they have come across for radome construction is laminated Fiberglas. Several layers of Fiberglas cloth form the outer layers; the inner core is made of honeycomb material whose thickness (about .33 in.) is carefully controlled. The total thickness differs with frequency of radar to be used.

coolness and get the program into gear.

▶**How It Started**—A short note scribbled in 1945 by then chairman of the board, C. R. Smith, to William Littlewood, vice president, engineering, started it.

"What wartime electronic device will prevent mountain-top collisions?" Smith asked.

R. W. Ayer was told to get a nucleus of engineers and go to work. Key men in the initial program (early 1946) were Sam Saint, project pilot; Frank White, electronics expert; R. Wisenbaker, communications specialist; and H. Wallace, engineer in charge of the installation and construction.

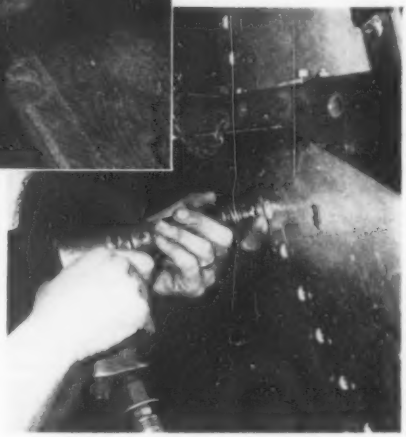
First project was mountain top collision. It got nowhere until White and Saint got the idea of using a "pencil beam" rather than a "flood light" beam projection. Solutions were found in three weeks, but many months were spent in perfecting equipment and techniques.

One of the major problems associated with mountain top avoidance was that heavy rain obliterated terrain indications on the scope. White combatted this with circular polarization which "screws the radar pulse into the air and returns it along the same path". Effect is to reduce return from precipitation. Terrain, in spite of precipitation, shows up as light spots with

From routing table...

LEFT: CLECO A-3 Impact Wrench driving ¼" x 3" screws into router table at Douglas Aircraft Company's Santa Monica plant.

to fuselage assembly...



RIGHT: CLECO E-3 Riveter driving rivets on fuselage assembly of Douglas DC-6 transport plane.

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CLECO AIR TOOLS Photos courtesy Douglas Aircraft Co., Inc., Santa Monica, Calif.

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dark areas, or radar shadows, behind them.

But horizontal polarization presents precipitation with great clarity. It also stretches the radar's range considerably. Rain areas show up as contours whose intensities vary, the "blob" on the scope becoming brighter as the rain gradient increases. An innovation, resulting from a small, AA-developed "black box," throws a black core on the scope where precipitation intensity is greatest. So pilots dodge black cores and the immediately adjacent bright peripheries.

▶**Pitching the Beam**—Angle of beam projection varies, depending on the job it is to do. For weather surveillance, it should be pitched up 3-10 deg., while for ground collision, 5-8 deg. down is desirable. There is no trick to changing beam pitch in flight.

Beard said there was still some argument concerning which wave band was the most desirable. He added that the "X" band did a reasonably good job in locating moderate to heavy rain and also detecting mountain tops.

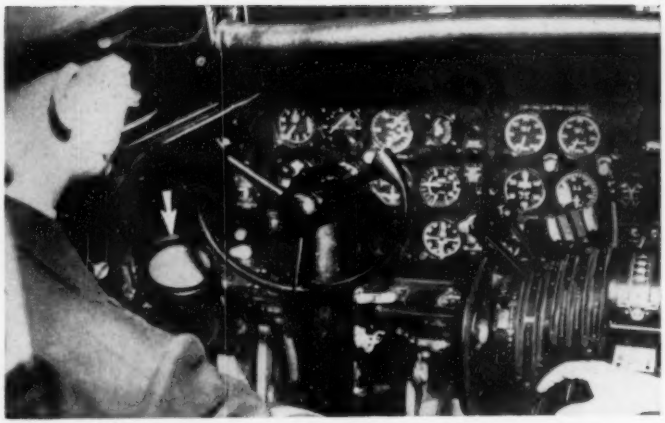
Problem is that if frequency is too low, slight amounts of precipitation will register on the scope and pilots will continuously be avoiding areas where turbulence is non-existent or negligible. If frequency is too high, dangerously rough areas will not always show up. Subsequent research indicates that the 5-cm. wave length gives optimum results for both weather surveillance and terrain clearance, Weisenbaker told AVIATION WEEK.

▶**Weather Next**—After collision research, next move for Avers group was to tackle the weather-mapping potential of their avionic device. They were attempting to "give the pilots eyes to see with during instrument weather."

An APS-10 radar set, installed in the nose of a DC-4, was operated with considerable success through Alaska from December, 1946, to August, 1949, according to AA officials. The set consistently enabled the pilots to avoid moderate to heavy icing conditions. Some supercooled vapor, whose water droplets were too small to register, was encountered. But it did not pose much of a problem because the areas affected were very localized and flown through quickly.

Reputation of the ship's ability to bore through rugged weather led the pilot of another company's DC-4 to ask permission to fly formation with AA's plane. Weather was reported as full icing conditions. Both planes got through safely. Ice can be flown around as readily as thunderstorms, according to AA officials.

▶**Avoiding Thunderheads**—Thunderstorm test flights on a Convair in the U. S. proved equally gratifying, Beard said. Positive identification of thunderhead cores consistently enabled AA's test crews to fly into thunderstorms. The radar fingered the turbulent areas with such accuracy that the ship was easily flown around the rough flying portions.



PILOT'S PPI (scope) shown installed in Convair 240, used in later experiments.

In one instance, the American Convair was able to fly an almost perfect on-course flight between two midwest cities, picking its way through predicted thunder weather. Regular commercial airliners operating in the same area detoured far out of their way—and many of them still gave their passengers rough trips.

Beard said the tests were so impressive from a passenger comfort point of view that he felt airborne radar was justified on that count alone.

▶**Beacon Navigation**—American's radar experts next tackled the problem of radar beacon navigation. For this type of work, a cosecant-squared beam (floodlight variety) is required. This phase of the radar set's capabilities was carried through to the end of the test program.

First project was to determine degree of accuracy with which a plane could be flown between two ground transponder beacons. In a very short time Saint and crew determined that a pilot could determine azimuth and distance with considerable accuracy and flights between beacons could be held to precise tolerances. And off-set courses could also be flown as accurately as forecast for DME and R-Theta computers.

Since the modified APS-10 set in the Convair is capable of transmitting either pencil beam or floodlight type beam, the set can take weather surveillance, mountain top collision and radar navigation in its stride.

▶**Supplementary Use**—While Beard stressed that AA is not trying to throw radar in as a "fundamental navigational device, radar can do most things other navigational equipment can do, equipment which, in many instances is considerably heavier and more expensive than radar." He suspects however, that radar will take its place as an excellent supplement to existing and coming low approach equipment.

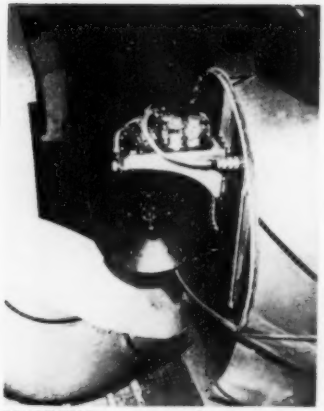
Beard indicated that with the use of transponder beacons modified to use American's "delayed pulse technique," any runway is a "potential" instrument landing strip.

▶**Delayed Pulse**—Here is how Beard explained instrument landings using delayed pulse radar transponders:

A plane wants to land at an airport equipped with GCA and ILS. But wind and weather conditions are such that the one instrument runway at destination cannot be used. One of the field's other runways is acceptable from wind conditions, but has no instrument landing aids. A car takes two radar beacons out to the acceptable runway. Pilot makes his approach on the ILS of the existing instrument runway. Then, above circling ceilings, he picks up the radar-identified strip and maneuvers into position to set down on it.

The delayed pulse technique enables him to see on his radar scope the heading of the runway he is being directed to, because one or more "blips" have been delayed, therefore show up at an expanded distance from the other pulses being emitted by the beacon. The "delayed blip" is expanded along the axis of the runway, extending well beyond the runway limit. It gives the pilot great magnification of alignment error and accurately tells him the strip's heading. Coding identifies the beacon to the pilot. The self-powered beacons will operate for about 48 hours on one battery change, AA spokesmen say. Units may also be plugged in.

Use of such beacons at smaller fields



SCANNING antenna and other gear in Convair nose. Fiberglas nose cover at left.

not equipped with ILS or GCA would enable pilots to "avoid 1930 type of flying instrument conditions," AA says.

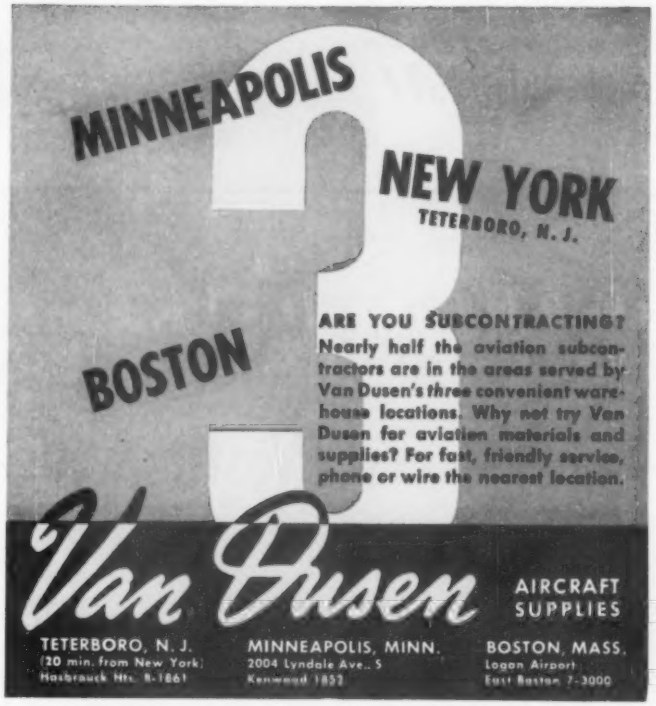
►**Easy Flying**—Beard emphasizes his case for delayed pulse radar instrument landing assistance: "Sam Saint, using delayed pulse techniques, made 14 consecutive approaches at Grumman airport with a 200-ft. ceiling. He was always in position to land. That is relaxed flying. I defy anyone to duplicate such a performance on ILS."

Beard admits that radar as a primary means of instrument landing is a long way off. It could never be considered as such until two complete radar sets are carried in the aircraft—one as a standby—and that will not be for some time to come. He insists that he is not proposing radar to supplant ILS, but merely as an adjunct to it. A lot of work with the CAA would have to be done before it could be put to any practical use.

►**How It May Come**—This is how AA thinks the radar will be installed and used in its DC-6s, for instance. Two scopes at least 6 in. in dia. will be installed in the far left- and righthand corners of the instrument panel, in the darkest locations, to avoid sunlight blotting out the picture. A point to consider is that radar rarely will be used when the sun is shining brightly. But better daylight presentation is a must and is well on the way, AA says.

It will not be necessary, normally, to observe the scope constantly. Nor will it be distracting to the pilot actually flying the airplane. Whoever is not flying will scan.

Although there are still many critics who take a dim view of airborne radar, its capabilities and potentials, American Airlines decision to pursue the subject actively will undoubtedly cause many airline executives and engineers to "reexamine their position."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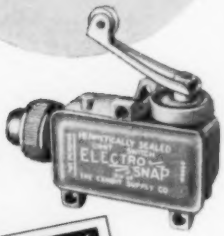

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NEW AVIATION PRODUCTS

For Lighter Seats

A special lightweight cushioning for aircraft seats, called "Aircraft-Texfoam," has been developed by the Sponge Rubber Products Co., Shelton, Conn.

The product is produced by impregnating resilient animal hair fiber with latex foam in the company's patented Texfoam process. Aircraft-Texfoam is estimated to be about 20% lighter than standard latex foam of comparable compression range.

A major application of the cushioning is in new Tourist and Sleeperette seats produced by the Aerotherm Corp. for Pan American World Airways new "Super 6" DC-6Bs now being groomed for trans-Atlantic coach service (AVIATION WEEK April 7, p. 50).

Plane Grommet

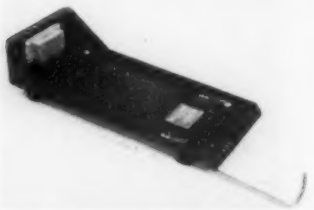
A new cable grommet for bulkheads and firewalls, developed especially to overcome difficulties encountered by aircraft manufacturers with other type grommets, has been announced by the Continental-Diamond Fibre Co.

According to the company, "aircraft manufacturers" were having breakage and assembly troubles with molded cable grommets. . . . " It is claimed the new one won't break, it can be flexed, in fact. And it speeds assembly, too, according to the maker. It is fabricated from a tough, laminated plastic that springs out and holds tight against the grommet hole in the bulkhead wall.

This is the way the new part is made and works: Fine-weave canvas Dilecto rolled tubing is cut into rings, then grooved and beveled. A diagonal slit releases the built-in tension of the ring. To insert in the bulkhead hole, it is compressed or overlapped to smaller than normal diameter. Once in, it springs outward, tight against the edge of the hole.

The new grommet also is mechanically and dielectrically strong, resistant to high heat, hot oil and excessive humidity.

Continental-Diamond Fibre Co., Newark, Dela.



Rack Speeds Mounting

A mounting rack, specially rigged to permit unusually fast, almost effortless installation and removal of the unit it supports, according to the maker, has been developed by the aircraft department of Westinghouse Electric Corp.

The rack incorporates a hand-operated mechanism which positively seizes the unit being mounted, moves it into place and locks it in a single, smooth operation. There's no fumbling or time wasted aligning the unit, with the electrical receptacle on the rack, Westinghouse claims.

Swinging an operating handle (right foreground) from open to close causes a pin which projects from the bottom of the rack to rise from its recessed position, engage the unit and guide it into place. The equipment is "effortlessly" disconnected, says Westinghouse, by rotating the handle 90 deg. in the opposite direction.

Westinghouse Electric Corp., Aircraft department, Lima, Ohio.

ALSO ON THE MARKET

"Coverlight" synthetic rubber tarpaulins of newly developed compound can be used for wing covers, engine covers, protecting tail surfaces and as covers for aircraft under Arctic an Tropic conditions. Material strongly resists tearing, weighs 5 oz./sq. yd., says developer, Vulcan Rubber Products, Inc., First Ave and 58 St., Brooklyn 20, N. Y.

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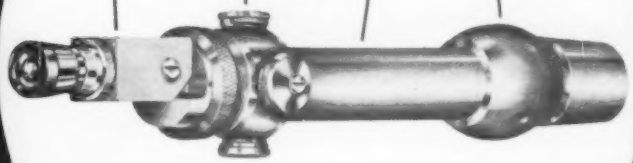

Magnification:	*30 X*
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Range:	*10" to infinity*
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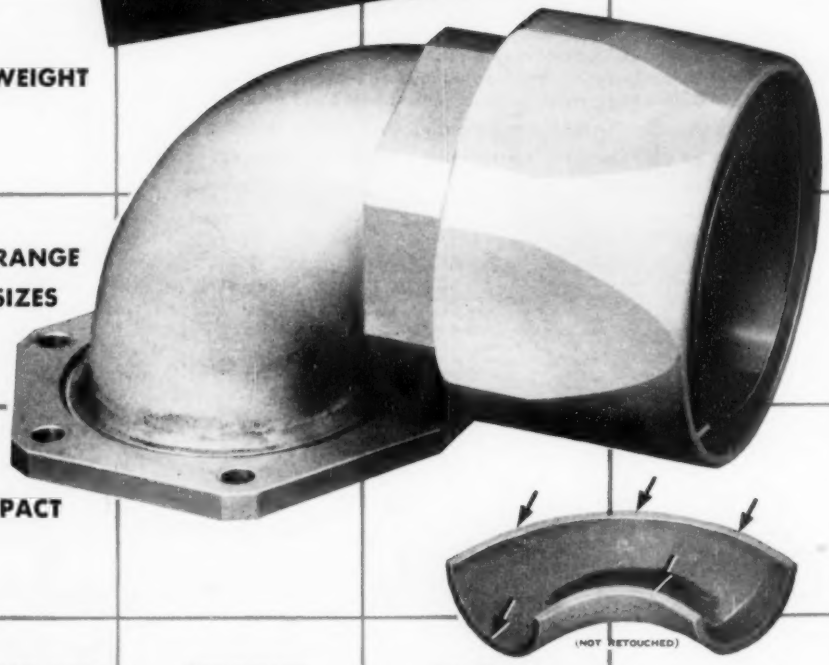

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The Structure of Army Aviation

As presently constituted, Army aviation is little more than a time and effort saver.

▶**Utilitarian Service**—Without a strategic or tactical role, it nevertheless provides the Army with a utility communications service of its own, without the bother of calling on another service to fill the need. It's the difference between driving your own car and calling a taxi all the time.

If supplies are needed quickly in a particular combat zone Army aircraft can rush them to the scene. If some top brass wants to tour the front, the Army has its own five-passenger fixed-wing aircraft available. Observation planes act as shepherd dogs to keep ground forces headed in the right direction and to check on accuracy of ground artillery fire and its effectiveness.

As of Oct. 31, last year, the Army had 1,570 aircraft on hand, both helicopter and fixed wing. Several hundred more are on order. In addition to observation and reconnaissance work, fixed-wing aircraft are used to lay wires, to move supplies in an emergency, to transport communications equipment. Of prime importance is their courier service. Engineering survey, photography and map making are part of their mission. They are also used to evacuate walking wounded.

▶**Copter's Role**—The principal mission of helicopters in Korea has been to evacuate litter patients, but they have also pitched in on many of the functions mentioned above, particularly the transportation of emergency supplies. Cargo helicopters, when they come into general use will carry troops and cargo exclusively.

Theoretically, the use of helicopters will facilitate river crossings by cutting down on the necessity for elaborate bridge construction. It also is expected that they will reduce the need for trucks and trucking personnel as well as the number of engineers for road maintenance. In time, large savings of manpower and material will be effected.

Army aviation is not organized as a separate branch. Instead, it is distributed through the Infantry, Artillery, Ordnance, Transportation Corps, Signal Corps, Corps of Engineers and Armor. Presently, the Medical Corps will have its own aviation units. Each Infantry division has 26 aircraft. The number of planes in nondivisional units varies according to their respective missions.

▶**Pilot Training**—The Army's pilots—officially designated as Army aviators—take 18 weeks technical training in fixed-wing aviation at San Marcos Air Force Base, Tex., followed by 13 weeks tactical training under Army auspices at Fort Sill, Okla. An additional eight weeks instrument flying and ten weeks helicopter training—five at San Marcos, five at Fort Sill—are given to selected graduates.

Instrument training is comparatively new for Army pilots, but increasing demands for all-weather flying have made it essential. All Army fixed-wing planes are equipped for instrument flying.

The scope of Army aviation is bound to increase as new types of aircraft become available. Still a dream, but one which will materialize in the foreseeable future, is the "convertiplane," which will rise like a helicopter and fly forward like a conventional plane. Helicopters may also be equipped with jet engines that will pyramid their speed.

▶**Copter Companies**—Army Transport Helicopter companies already have been activated. Other formations are scheduled to appear on unit Tables of Equipment.

Aviation Week, 4-14-52

Army Aircraft Infantry & Airborne Divisions[1]

	Two-place fixed-wing	Multi-place fixed-wing	Utility helicopter	Cargo helicopter
Division Hdqtrs. Co.	1	2	3	—
Division Signal Co.	—	—	2	—
Div. Combat Engr. Bn.	—	—	1	—
Inf. Regt. Hdqtrs. Co.[2]	3	1	3	—
Field Arty. Bn.[3]	6	—	—	—
Div. Arty. Hdqtrs. Btry.	1	1	1	—
Totals	13	3	10	—
Non-Divisional Units				
Corps Hdqtrs. Co.	3	3	2	—
Army Hdqtrs. Co.	2	6	—	—
Engr. Cmbt. Group Hdqtrs.	—	—	2	—
Engr. Cmbt. Bns.	—	—	1	—
Engr. Topo. Bn.	1	—	3	—
Infantry Regts.	1	—	1	—
Field Arty. Groups	2	—	—	—
Field Arty. Bns.	2	—	—	—
Field Arty. Obs. Bn.	—	—	3	—
Corps Arty. Hdqtrs. Btry.	2	1	—	—
Field Arty. Brigade	2	—	—	—
Sig. Bn., Corps	2	—	3	—
Sig. Operations Bn.	5	—	2	—
Hdqtrs. Co. Armd. Cav. Regt. (light)	2	—	—	—
Armed Recons. Bns.	2	—	—	—
Tank Bns. (Separate)	1	—	—	—
Ord. Art. Maint. Co.	—	1	—	—
Transp. Helicopter Co.	—	—	2	20
Medical Air Evac. Units.	—	—	5	—

[1] Quantities of organic aircraft in the armored divisions differ slightly from the infantry and airborne divisions.

[2] One plane for each of the three infantry regiment hdqtrs. companies.

[3] Two planes for each of the four artillery battalions.

SOURCE: Department of Defense.
Aviation Week, 4-14-52

Army Aircraft

FIXED WING

Type	Description	Mfr.
L-19 Bird Dog	Two-place observation plane for artillery, infantry, armored units.	Cessna
L-5	Two-place observation plane(being replaced by L-19).	Convair
L-16	Two-place observation plane(being replaced by L-19).	Aeronca
L-17 Navion	Pilot, 3 passengers or equivalent cargo; equipped for instrument flight; being replaced.	Ryan
L-20 Beaver	Pilot, 6 passengers; or pilot, 3 litter patients and one medical attendant; or pilot and 1,900 lb. of cargo; equipped for instrument flying.	de Havilland (Canada)
L-23	Pilot, 5 passengers; comparable cargo; can operate on one engine if necessary; for long-range all-weather flying.	Beech
LC-126	Pilot, 3 passengers or equivalent cargo; equipped for instrument flight; replacing L-17 in U. S.	Cessna

HELICOPTERS

Utility

H-13D	Pilot, one walking wounded inside, 2 litter patients outside; reconnaissance, evacuation of wounded, wire laying, resupply.	Bell
H-23	Pilot, 2 litter patients outside; reconnaissance, wire laying evacuation.	Hiller
H-25	Pilot, 5 passengers or 1,200 lb. of cargo; evacuation.	Piasecki

Cargo

H-19	Pilot, 8-10 passengers or 2,000 lb. of cargo.	Sikorsky
H-21	Pilot, 15-22 men or 4,000 lb. of cargo; Transportation Corps.	Piasecki

SOURCE: Department of Defense.
Aviation Week, 4-14-52

ALPA Proposes Prop Reversal System

- **Pressure relief valve, lever control included.**
- **Pilot alone could cause prop to go into reverse.**

By F. Lee Moore

The Air Line Pilots Assn. believes it has found a simple system to stop unintentional propeller reversal on hydraulically controlled systems made by Hamilton Standard.

Hamilton Standard plans to complete a test installation of the control system modification about next week. The design was conceived less than two months ago—Feb. 28—at a pilot conference with American Airlines engineer David Noyes.

Meanwhile, CAA is writing up its own detailed re-study of the problem of inadvertent prop reversal, chiefly gleaned from recent industry tours and conferences (AVIATION WEEK Mar. 10, p. 63).

The pilots' program appears more direct than the industry-CAA approach. The pilots got CAA to cancel the regulation that required in-flight prop feathering during check flights. And they have come up with a basic mechanical system to prevent inadvertent prop reversal.

▶**Wins Approval**—Officials of both Hamilton Standard and Civil Aeronautics Administration said they liked the basic idea of the pilot-proposed modification to the prop reversal system. It was presented to them last month by American Airlines' Capt. C. Daudt. He represents ALPA on the industry-CAA program to eliminate chances of inadvertent prop reversal.

Hamilton Standard's chief engineer, Carl F. Baker, is studying the pilot program personally. CAA powerplants engineer David L. Posner, who is preparing prop reversal recommendations for the CAA Administrator, said last week that the pilot program looked like "a good, conservative system, but requires study to decide whether it is practical."

All this pilot-industry-CAA attention on inadvertent prop reversal is spurred by the recent fatal National DC-6 and American Convair crashes at Elizabeth, N. J. Both may have been caused by inadvertent prop reversal; the National crash probably was and the Convair crash may have been, according to CAB accident investigators.

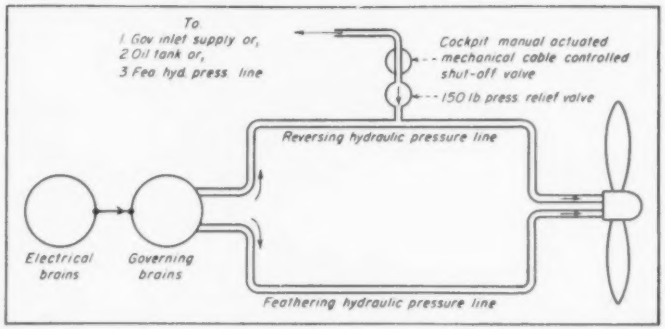

DIAGRAM shows system for blocking out unintentional prop reversal proposed by ALPA. Hydraulic pressure relief valve (shown near top center) will let off any pressure above normal 150 lb. Pilot closes valve manually to actuate reverse mechanism.

▶**How It Works**—Here's how the pilot-proposed system works:

Normal pressure in the prop reversal hydraulic line is about 150 lb.; pressure up to 300 lb. goes through the reversing line to reverse the prop. Electric and governor controls ("brains") send the extra reversing pressure through the line; if these controls get out of kilter, inadvertent reversal may result.

So the pilots take a direct approach to eliminate this risk. Instead of tinkering with improvements in the electrical and governor "brains" to make them less apt to fail, they propose a cutoff in the system to stop the reversing pressure even if there is a failure in the controls. A pressure relief valve in the reversing line would let off any pressure above the normal 150 lb., so the 250-300 lb. reversal pressure couldn't build—unless the pressure relief valve were purposely shut by the pilot.

▶**Manual Operation**—And that is the pilot system. When the pilot wants to reverse, he pushes a lever on the controls pedestal. This manually closes the pressure relief valve by a mechanical cable that pulls the valve closed. The valve is spring-loaded to stay open.

The pilot would close the shutoff valve by a deliberate act—and only on the ground, when he wants to reverse.

The normal open position of the pressure relief valve allows a maximum of 150 lb. pressure in the reversing line. This is enough pressure for all prop governing in the normal range, the ALPA technical group says—un-reversing, feathering and unfeathering.

Installation of the valve is made simpler than would be expected; on the nose section of the engine there already is a threaded plug, used for tapping the reversing hydraulic pressure line in ground tests.

▶**The Pilots' Viewpoint**—The pressure relief valve and the cable-controlled shutoff valve can be made in one casting and mounted on the nose section.

The pilots say they have had to devise this system because airframe, engine and prop manufacturers and the airlines have been passing the responsibility back and forth without installing a positive device themselves. They also oppose the present trend toward trusting electric brains on critical controls.

Unless the mechanical shutoff or something like it is adopted soon, "more in-flight reversals with resultant losses will occur, and we'll be right back where we started from," says the pilot report. "At least weekly, we are now experiencing inadvertent reversals on the ground due to electrical and governing malfunctions," the report adds.

As a supplement to the mechanical shutoff system, the pilots recommend a reverse warning light in the cockpit, to warn when the prop blades get below the low-pitch stop setting.

▶**Present Danger**—The prop reversal system is complex. That's why pilots want to install this manual bypass. A simplified outline of how a prop reverses:

When a plane lands, weight on the landing gear actuates a solenoid which unlocks the reverse portion of pilot's throttle quadrant. Pilot then can pull the throttle all the way back, activating

THE PILOT NEEDED CAT EYES

Even 20-20 vision could hardly see the dimly lit face of old radar screens! The time lost as the pilot's eyes adjusted themselves from a glaring haze-blanketed sky to a low-illumination radar screen was too long. In aerial combat life or death depend on instant recognition and reaction.

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an electrical switch system which operates the hydraulic valves and sends about 250 lb. pressure into the prop-reversing hydraulic line (compared with normal pressure of about 70-90 lb. in the system). The pressure pushes a servo-piston which unlocks the low pitch stop on the propeller. The pressure goes on to push the blades into reverse pitch.

Failure in the throttle solenoid circuits or in the maze of electrically operated hydraulic system can send reversal pressure into the reverse line when it isn't wanted, pilots say. One way this can happen: If pilot holds out the unfeathering button too long and there is trouble in the system at the same time, a prop can go from feather through high pitch and low pitch and past the low pitch stop. Once past the low pitch stop, prop goes on into reverse.

Ten-Year Certificate Asked for Robinson

Robinson Airlines, New York State local service airline, would get a renewed certificate good for ten years if Civil Aeronautics Board follows the recommendation of CAB Examiner Edward Stodola. A ten-year renewal will give the line a better chance to plan, and perhaps to replace the DC-3 with newer aircraft types, he indicated.

A long-term certificate improves chances of financing expansion and equipment replacement, Stodola points out. Previous temporary certificates were only for five years.

Bankers and investors shy from investing money in an operation with only a short-term outlook, Stodola indicated. The Board apparently is not ready to grant permanent certificates to the locals.

A ten-year certificate appears to be the trend of CAB examiners' recommendations for well-established lines. Examiner F. D. Moran asked a ten-year renewal for Piedmont recently.

For Robinson, the CAB examiner also recommends route improvements. These include the right to fly nonstop on eight route segments and route extensions to Watertown and Saranac Lake/Lake Placid.

NYA Gets Ready For Copter Service

New York Airways directors have taken the first three steps toward changing the recently certificated helicopter line (AVIATION WEEK Mar. 24, p. 16) from a paper company to a going concern.

They have appointed two executive officers, started collecting working capital and begun shopping for helicopters.

The directors appointed former Pan American Atlantic division Manager Robert L. Cummings, Jr., as president and chief executive officer of NYA. Former NYA president and organizer of the company, John L. Senior, Jr., is now chairman of the board. The change is to streamline management authority.

► **The Setup**—In making its financing contract with NYA, Smith, Barney & Co. said the company must appoint an executive vice president under President John Senior. But the directors decided that having both a president and an executive vice president in so small a company would confuse the lines of management authority.

Meanwhile, former United Air Lines engineer Jack Rothman had already been named operations manager of NYA. While with United he prepared data for United's helicopter application in the Chicago copter service case of CAB. Later he joined the New York Airways group and represented NYA with Los Angeles Airways in order to gain operating copter experience.

The hardest step NYA must take before starting operations is to acquire the copters. But a spokesman says the results of inquiries to date indicate NYA may be able to get "a limited number" of copters without cutting in on production earmarked for military orders. But, he said, NYA would have to get military priority to build the full-scale copter service planned.

Three More Airlines Cut Night Coach Fare

The Civil Aeronautics Board forced a 12% cut in the night aircoach fares of three more airlines this month. Capital, Delta and Eastern reduced coach fares from 4½ cents to the 4-cent maximum set by the Board for off-peak hours.

But two other airlines—United and Western—kept their night coach rates at 4½ cents; they did this by juggling their flight schedules to stay just within the Board's definition of on-peak flight hours. The Board allows a 4½-cent maximum fare for peak-hours flights, defined as those departing before 10 p.m.

CAB had suspended all off-peak-hours aircoach tariffs slated to operate at more than 4 cents a mile after Apr. 1. So the airlines had to cut these fares to 4 cents or else change the flight hours to qualify technically as "on-peak-hours."

Meanwhile, National Airlines cut the rest of its coach fares also to 4 cents a mile. National had previously filed a $43 fare New York-Miami at slightly less than 4 cents a mile.

National had told the Board the rest of its coach rates would come down to 4 cents, too, but National did not act on these rates in time to avoid the CAB suspension order. Immediately after the Board order last month, National filed rates of 4 cents a mile or less on all its coach services.

EAL Says Higher Fares Are Necessary

Eastern Air Lines reports net earnings of $7,231,621 or $3.02 a share for 1951—a 28% gain in earnings on a 25% revenue increase over 1950. In his report, Eastern President E. V. Rickenbacker warns that although traffic growth is encouraging, two CAB policies make the outlook uncertain—mergers of smaller companies and daylight aircoach.

Of the total revenues of $98,300,642, passenger fares accounted for 94%, or $92,589,670. Air mail revenue dropped 26% to $2,536,225 because CAB set the 1951 mail rate at 45 cents a ton mile, compared with the previous sliding scale that averaged 66 cents the year before. The 45-cent rate is set by CAB as the "final mail rate" and is described as compensatory—no subsidy.

► **Profits May Fall**—At an informal dinner announcing Eastern's 1952 report, Rickenbacker warned that costs are rising. That, combined with the Newark Airport closing and the introduction of new aircraft, means 1952 profits may fall below last year's record, Rickenbacker indicated.

Higher fares are a necessity, he added, and the daylight aircoach fares approved by Civil Aeronautics Board threaten to break the rate structure of the industry. "CAB's timing is all wrong; the CAB, like most geniuses, is two years behind the times," Rickenbacker commented about the daylight aircoach policy of the Board. CAB approved National Airlines' daylight coach service New York-Miami at the same $43 rate as Eastern's new night coach fare.

► **Ticket Costs**—On the airline proposed fare increase then before CAB, Rickenbacker illustrated why fares should go up $1 a ticket one way, and the roundtrip discount should be eliminated. It costs Eastern $1.54 to issue a ticket—no matter what the distance—he said (comparing this with an industry average of $2.02). He indicated that the $1 raise would help pay for this ticket issue cost on the shorthauls where it's most important.

In his comment on the roundtrip discount, "salesmen are all alike—they'd rather give something away than sell it," he said. The discount is unnecessary—even for sales promotion, he said. He demonstrated this contention by citing figures presented by Delta President C. E. Woolman. Delta found the same 30% of coach passengers buying roundtrips (without discount) as buy the first-class roundtrips that carry the discount.

Showdown Nearing on Subsidies

Airlines can expect uphill fight with Congress this year on federal aid; it may be cut off in fiscal '54.

By Katherine Johnsen

Scheduled airlines face an uphill fight for government support from now on.

This was clear as House Interstate and Foreign Commerce Committees completed two weeks of hearings on legislation separating subsidy from air-mail pay. The Senate already has approved a bill, making it a virtual certainty that separation legislation will be on the books before this session adjourns, probably in July.

This is the outlook:

• That Congress will lay down a formula of "cost plus reasonable profit" for determining mail pay for both domestic and international carriers.

This is vigorously opposed by the scheduled airline industry which wants "value of service" given weight in the determination of mail rates for domestic carriers and the $2.86-ton-mile Universal Postal Union rate established as the compensatory rate for international carriers.

The Senate-passed bill directs the "cost" formula for domestic carriers, and the House is expected to take the same position.

But indications are that the House will turn down the Senate bill's provision for the UPU rate for international carriers and approve a measure directing "cost" as the yardstick for international mail rates, as well as for domestic. This is urged by both Civil Aeronautics Board and Post Office Dept.

• That railroad interests, nonskeds and economy-minded members of Congress will make a major effort to eliminate government support to airlines once separation legislation is enacted and direct appropriations are made to CAB for subsidy.

CAB Chairman Donald Nyrop recommended that responsibility for appropriations for subsidy payments to domestic carriers be transferred to the Board for the fiscal year beginning July 1, 1953, and for international carriers for the fiscal year beginning July 1, 1954.

This would mean that the first showdown in Congress on funds for subsidy payments to domestic carriers would come early next year when CAB's appropriation for the 1954 fiscal year is taken up.

▶**Key Points**—These were key points at issue in the House hearings:

• **How should mail rates be determined?** Air Transport Assn. general counsel, Stuart Tipton, argued that CAB should be given latitude to establish "fair and reasonable" rates, the wording of legislation guiding Interstate Commerce Commission in setting railroad mail rates.

Post Office Dept. and railroad interests opposing this pointed out that ICC always has used the latitude to fix mail rates at less than "cost plus reasonable profit" to spur efficiencies. But they indicated apprehension that CAB would use the latitude to set rates at higher than cost plus reasonable profit, giving account to such factors as "value of service."

• **Who should carry the mail?** Post Office proposed opening the mail-carrying field to nonskeds and scheduled freight carriers.

Assistant Postmaster General John Redding said the Department should formally request separate legislation permitting the Department "to contract for the movement by air carrier at rates lower than those established by the Board when the interest of the postal service requires."

But several members of the House Commerce Committee want to tack a provision onto the pending legislation giving the Postmaster General a free hand to contract for transportation of airmail.

Redding commented: "The reason for requesting this provision is to enable the Postmaster General to contract for plancload movements of mail, to equalize rates where the mileages flown by various carriers between competitive points vary substantially, and to obtain service where a carrier is unwilling or unable to transport mail."

He pointed out that the mass of mail moves late in the evening when there are fewer scheduled passenger flights. The department is now making a survey looking to mass night movements by aircoach services of the scheduled airlines, air freight operators, and nonskeds.

• **Who should be eligible for subsidies?** Senate-passed legislation would restrict the granting of subsidies in the "commerce" and "national defense" interests to scheduled airlines carrying mail, seconding ATA's stand.

But scheduled freight carriers aiming to become eligible for government assistance have Air Force support. Undersecretary for Air Roswell Gilpatric reported: "The Department of Defense would prefer that 'any certificated air carrier be made eligible to apply for subsidy.' If mail pay is to have an actual service or use basis there would seem to be no reason to relate separate subsidy payments to the carrying of mail.

"The Department of Defense has a two-fold interest in defense requirements concerning civil aircraft. These requirements are for passenger and light cargo aircraft and heavy cargo transports. It is the opinion of the Department of Defense that it would be inconsistent to deny the government the possibility, if desired in the national interest, of subsidizing operators of heavy freight aircraft requiring little conversion for military use."

▶**Sked Viewpoint**—Scheduled airlines feel that making all-freight carriers eligible for subsidy would be the wedge opening the field to non-skeds also.

Assn. of American Railroads urged that subsidies be restricted to payments for specific features included in equipment at the request of the Department of Defense which might increase the usefulness of equipment if converted for use in military service in time of war.

CAB Certificates For Nonskeds Asked

President Orvis M. Nelson of nonscheduled Transocean Air Lines has called on Civil Aeronautics Board to grant certificates of public convenience and necessity to qualified nonscheduled airlines. He presented Transocean's views on the need for such certified airlines as "supplementary air services" in a speech to the Aero Club of Washington, D.C.

The Board has said that nonscheduled carriers must continue existence, Nelson pointed out. But, he said, some kind of permanent certification is necessary to preserve them.

"Such (exemption) authority lacks tenure, is subject to change at whims of the regulatory body, precludes efficient financing and planning and is a barrier to economic security," Nelson said.

Transocean, he said, is gratified by recent CAB commencement of an investigation of policy on nonscheduled lines. Transocean advocates that the Board grant to qualified nonscheduled lines a flexible but limited authority to conduct charter and common carrier aircoach services.

Crash Cause Unknown

Civil Aeronautics Board has finally had to give up after a 14-month search for the cause of the Northwest 2-0-2 crash at Reardon, Wash., Jan. 16, 1951, killing all 10 aboard. "Sudden loss of control for reasons unknown, resulting in rapid descent to the ground," is the necessary CAB conclusion. Details appeared in AVIATION WEEK (Mar. 10, p. 64).

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TV Tested As Aid To Control Towers

U.S. Weather Bureau is televising bad-weather landing approaches of airliners at Washington National Airport, under an Air Navigation Development Board-sponsored $10,000 evaluation program. Chief aim is to find how television can help airport controllers measure visibility and cloud ceiling just as the pilot encounters it in his landing approach.

The Bureau is using a DuMont industrial television set.

The TV camera, located at the runway threshold, reveals an approaching plane at about the same instant it is spotted by the eye of a trained observer stationed at the same point. But the TV camera and transmitter sends the picture to the airport tower, where approach conditions can be continuously analyzed and described to incoming pilots.

► **May Increase Scope**—But the problem is to measure slant visibility in the approach glide path before, not after, a plane comes into view.

After preliminary experimentation with the TV potential, the Weather Bureau may try TV observation of slant visibility by stationing flares or balloons in the approach path. The Royal Aircraft Establishment is experimenting along this line at Farnborough. Flares are fired into the approach zone from varying distances from the runway threshold where the TV camera is located. Also, balloons are raised in the approach zone, and a searchlight is focused on them from the runway end.

Light conductivity of the atmosphere is measured separately by transmissometers; that data is correlated with slant visibility measurement taken from the TV observations.

► **Evaluation**—All of this is in the early development stage. The Washington evaluation program was hastened by Rep. Carl Hinshaw, who expressed an interest in the project during Weather Bureau and ANDB testimony at the recent House Aviation Subcommittee hearings on Newark Airport conditions.

Washington tower operators are being asked also to evaluate use of the televised approaches as an aid to departure control. Another advantage in an approach TV installation is that it can be turned around by remote control to show a pilot's view of runway.

SHORTLINES

► **Air Coach Transport Assn.** has canceled plans for a membership meeting in Washington this month. Next will be annual convention this fall.

► **American Airlines** will order jet transports next, the recent order for 25 DC-7s was probably the last American order for piston-powered transports, according to a recent speech to the Salesmanship Club by Walter H. Johnson, Jr., assistant to AA president C. R. Smith. . . . Has appointed six regional officers as "supervisor-mail traffic" in a drive to boost American's share of air mail volume. They're to "analyze dispatch schedules as issued by local postal units. . . . Also keep tabs on the competitive situation. . . ."

► **Bonanza Air Lines** has tentatively determined final mail rates set by CAB at: $1,067,195 Dec. 19, 1949-Sept. 30, 1951; $643,353 Oct. 1, 1951-Dec. 31, 1952, and a rate estimated to produce annual mail pay of $551,531 starting next year.

► **British Overseas Airways** plans ten luxury and six aircoach flights a week on summer trans-Atlantic schedules.

► **Capital Airlines**, to lick a problem of warming pilots' legs in Constellations, where ducting of warm air is difficult—may try a General Electric radiant heating panel.

► **Central Airlines** is recommended for renewal of its certificate by CAB public

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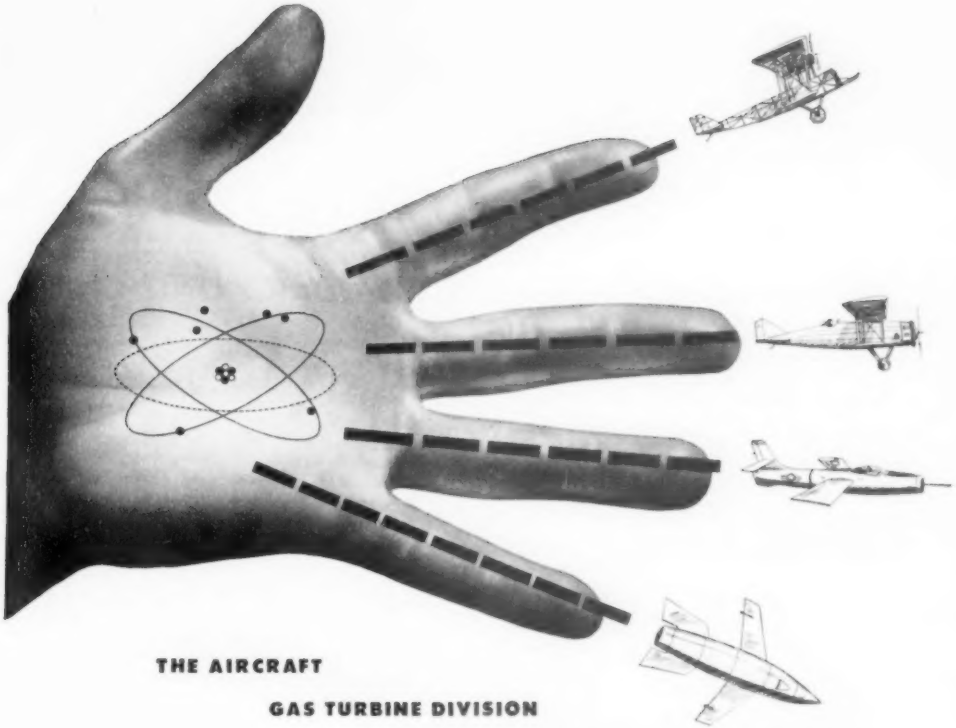

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counsel, generally on the route system proposed by Central.

► **Civil Aeronautics Board** again has approved the airlines' 10% fare discount on military movements, this time for fiscal 1953. Member Josh Lee dissents, as in previous years, on grounds that discount "to special groups . . . is discriminatory. . . ."

► **Colonial Airlines** stockholders are slated to vote Apr. 16 on whether to approve the National merger for ⅝ share of National common stock for one Colonial. A Washington attorney is reported head of a rebel group opposing the merger, claiming Eastern will offer a better contract.

► **Frontier Airlines** final mail rate is tentatively set by CAB at $3,431,399 June 1, 1950-Sept. 30, 1951, and an estimated $2,614,073 per year starting 1st Oct. 1.

► **Argentine Airlines** has contracted with Lockheed Air Service to modify DC-4 instrument panels making them like the DC-6.

► **Los Angeles Airways** February operating expenses per mile are reported $1.49 compared with $1.28 a year ago. Increased cost of flight and ground operations and direct flight maintenance are chief reasons cited by officials of the carrier.

► **Military Air Transport Service** and Navy are painting most of their transports' upper fuselages white to cut cabin heat absorption from sun.

► **Pan American World Airways** must give its merged American Overseas employes (except pilots) seniority as outlined in CAB order of Nov. 27; CAB stayed its formula-setting order Jan. 14 but recently dropped the stay. . . . Company asks the Board for inclusion of Hawaii on one route between Miami, Caribbean area, and South America.

► **Trans World Airlines** starts Constellation service on its New York-Chicago-San Francisco aircoach service Apr. 27. TWA and United operate DC-4 coach only on this route at the present time.

► **United Air Lines** has filed a tariff with CAB raising its "family fare" from the present one-half of standard fare to three-fourths.

► **Wisconsin Central Airlines** has its temporary mail pay set by CAB at $849,281 June 14, 1951-Feb. 29, 1952, and at 56 cents a mile starting 1st Mar. 1.

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38	18597-2	Airsearch	Aluminum Oil Cooler
120	MF9-713-15A	Vickers	Hydraulic Pump
700	TFD 8600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
50	9P771-A	Pesco	Fuel Booster Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H960-K & KA	Pesco	Hydraulic Pump
19	AN5531-1	G. E.	Tach. Generator
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
16	76B19	Lewis Eng.	Cyl. Head Temp. Gauge
10	4682	Lewis Eng.	Air Temp. Ind.
31	47B21	Lewis Eng.	Temperature Ind.
18	47B22	Lewis Eng.	Temperature Ind.
20	47B23	Lewis Eng.	Temperature Ind.
36	47B24	Lewis Eng.	Temperature Ind.
10	76Z2	Lewis Eng.	Air Temp. Ind.
11	76B4	Lewis Eng.	Temperature Ind.
20	77C4	Lewis Eng.	Temperature Ind.
21	77C5	Lewis Eng.	Temperature Ind.
85	727TY79Z2	Weston	Left Wing Anti-icing
88	727TY73Z2	Weston	Right Wing Anti-icing
83	727TY74Z2	Weston	Tail Anti-icing
11	2227-11D-3A	Eclipse	Dual Tachometer
44	5BA25DJ4B	G. E.	DC Motor (⅓ HP)
83	A4934	Delco	Motor
50	RD8220	Holtzer Cabot	DC Motor
115	P4CA2A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32226)	Nasco	Ignition Switch
687	RS-2	Mallory	Selector Box
90	JH950-R	Jack & Heintz	Starter Motor
492	S-841 (94-32253)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Seperator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117-47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart Warner	Heater
230	921-B	Stewart-Warner	Heater (200000 BTU)
340	981280	Kidde	Co2 Cylinder
85	12994-2	Adel	Lock Valve
90	923748	Kidde	Oxygen Cylinder
80	DW28	Eclipse	Transformer
97	6041H-146A	Cutler Hammer	Relay (B-12)
28	0655-D	Aro	Oxygen Regulato
148	PG208AS1	Minn. Honeywel	Air Ramp Switch
33	DW47	Eclipse	Transformer
11	DW33	Eclipse	Transformer
65	ASDC2	CO2 Mfg. Co.	Fire Detector
600	ND21	American Gas Accumulator Co.	Time Delay Relay
30	U6005-DV5	United Air Prod.	Oil Temp. Reg. 5°
29	UA-3160	United Air Prod.	Oil Temp. Reg. 6°
95	UA-3160C	United Air Prod.	Oil Temp. Reg. 6°
73	UA-6007-CF-DV5	United Air Prod.	Oil Temp. Reg. 7°
14	UA-6009-S-30	United Air Prod.	Oil Temp. Reg. 9°
11	UA-6012K-S30K	United Air Prod.	Oil Temp. Reg. 12°

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Quantity	Part No.	Description
247	PD12K10	Stromberg injection Carburetor
19	1375F	Holley carburetor
407	SF9LN-2 (manufacturer's part No. 10-12453-6 Spec. AN9511)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10-20170-1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)
30,000	LS-6S9A	Bendix Scintilla Spark Plug

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Quantity	Part No.	Description
328	PD12K10	Stromberg injection carburetor
236	PR48-A1	Stromberg carburetor
29	PR48-A2	Stromberg carburetor
31	PR48-A3	Stromberg carburetor

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Quantity	Part No.	Description
166	1045A	Bearing
500	3506	Flange
130	8388	Follower Ass'y
814	35814	Blower Ass'y
53	48302	Shaft
175	48363	Shaft
56	48398	Sump
390	48461	Gear
78	76236	Gear
1178	84289	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
200	84085	Cylinder

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3000	KF4H
30000	KP4R16-2
3300	K5FS
17000	BC5W11
28000	K56A
7000	38KD4
6600	RE3MR3
5000	F35-14

ACTUATORS

Quantity	Part No.
42	400AJ3
161	420 EC
160	420 DY
12	M-2031 (Air Associates)

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LETTERS

Wrong Salary

Just to keep the record straight the total salary received by the writer for the fourth quarter of 1951 was $3,300 and not $13,200 as reported by AVIATION WEEK, Mar. 10, 1952, in listing receipts or expenditures of aviation industry groups and individuals registered under the Congressional Lobbying Act.

While my copies of the report show the correct sum for the quarter, one of the six copies of the two-page report filed slipped in the typewriter so the annual figure appeared on the form a line too high. This resulted in the annual figures being reported as that for the quarter, hence the mistaken reporting. The proper figure will be printed in a correction in the next listing in the Congressional Record several months hence, and is being corrected in the permanent edition of the Congressional Record.

We're a bit red faced because of kidding of our friends and an increasing amount of sucker list mail. Will AVIATION WEEK please clear the record with a paragraph on this?

WAYNE WEISHAAR
Aeronautical Training Society
1025 Connecticut Ave.
Washington, D. C.

CAA 'Out of Touch'

Your articles on CAA and the mess the Office of Aviation Safety has gotten itself into has been well received by most everyone I know in the industry. But I think you are missing . . . the tremendous amount of waste and inefficiency . . . because the people who have been setting up the present clique are so out of touch with the need of aviation today that they are driving away—rather than keeping—those who could do the job expected of an inspector of the CAA.

Answers to the following questions would be interesting to a lot of taxpayers:

1. In case all the reorganizations that have taken place in CAA have been necessary, isn't it due to the fact that the ones who have been in charge did not know how to set up a section right? In case that is true, why does the same Hensley-Davis group always make the reorganization and end up in charge?

2. How many pilots now employed in the Aviation Safety Office could actually make a safe ILS or GCA approach in a modern four-engine airplane? I do not mean what their certificate says they can do, but what actual experience they have had. Could Mr. Hensley?

3. How many of the aviation safety men in maintenance ever really handled a job large enough for them to qualify for their jobs? These people today, especially in air carrier work, are responsible for many decisions that cost many thousands of dollars. I think people would be surprised if they knew how little some of these men know about their line of work.

4. Why have so many people suddenly decided to leave Washington and go back to the regions, some at a loss of salary? Any agency that cannot keep people like Bill Moore and other important people happy where they are must have something wrong with it.

My comments come from several years with CAA as an inspector and later in another department. . . . I have honestly never been a party to anything that would hurt CAA or aviation, but it hurts to see the agency go to hell while the present group runs things with an iron hand toward disaster.

Please run some articles on the heads of the various CAA departments, showing the flying time of the heads, what aircraft they are qualified on, most recent instrument flights, etc.

Do this also on the maintenance people using those items that would show the qualifications they have had to hold jobs paying from $10,000 to $11,000 a year. I'll bet you won't be able to get this from Hensley or many of his supervisors.

The old stuff about not being able to get better qualified people is not true for there are many airline people who leave each year to take jobs in industry that pay no more than the CAA pays inspectors, but these people do not want to work for people like Hensley.

Please stay with this until you get results, for you are doing one of the best things possible for aviation.

CAA EMPLOYE IN THE FIRST REGION

Look! No Tail?

I have heard of the bicycle being ridden no hands but I strongly doubt that the Northrop Scorpion F-89, as shown on the cover (Minneapolis Honeywell ad) of your Jan. 14th issue can be flown without a tail.

RANDALL H. RICE
Specialties Section
Westinghouse Electric Corp.
1216 W. 58th St.
Cleveland, Ohio

Fairchild's First

Your Mar. 17 issue . . . reported in quotes that Convair claimed the "first plant in the U. S. constructed exclusively for production of guided missiles."

The Fairchild Guided Missiles division was to my knowledge the first to begin construction of a plant devoted exclusively for the development and production of guided missiles, and work on this plant was begun before announcement of the Convair plant.

Secondly, the shop operations have already been moved into the plant and within the next week or ten days the engineering and office groups will be moved into the new plant. Therefore, the Guided Missiles division was the first to start a plant and the first to finish one.

Furthermore, the Guided Missiles division plant is constructed with Fairchild funds and so is not a government-provided facility.

I realize that the plant is not as large as that which is being built for Convair, but since the claim was that Convair's is the first guided missiles plant, I would think this worth calling to your attention.

E. E. HENKEL,
Public Relations Manager
Fairchild Guided Missiles Div.
Fairchild Engine and Airplane Corp.
Farmingdale, N. Y.

WHAT'S NEW

New Publications

CAA Seaplane Facility Directory, gives data on the number and length of landing lanes, services available, fuel and location facilities at the country's floatplane bases. Also indicated are obstructions, closed and abandoned sites. Price 10 cents, 30 pages. Write Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

Airworthiness Directive Summary, issued annually by CAA, will be sold through the Government Printing Office. The 1952 Summary costs $1.50. It had been distributed free of charge. CAA Airworthiness Directives, issued every two weeks, specifying modifications and inspections necessary to keep civil planes airworthy, will continue to be distributed free.

New Course

College correspondence course in aviation to provide ground school training is offered by University of Illinois. It provides three college credit units to those desiring them. Course costs $15, with books and materials being about $4.50 additional. Write the Division of University Extension, Urbana-Champaign, Ill., for further information.

Publications Received

- **Nomography and Empirical Equations,** by Lee H. Johnson, published by John Wiley & Sons., Inc., 440 Fourth Ave., New York 16, N. Y., $3.75, 1952. A useful guide to quick efficient methods for handling experimental and operational data in business, industry, professional practice, and research.
- **Instrument Transformer Buyer's Guide,** published by General Electric, Schnectady, N. Y., 1952. Basic, up-to-date information on the complete line of General Electric indoor and outdoor potential and current transformers.

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EDITORIAL

Everything Depends on Safety

Another commercial plane has crashed into the heavily populated New York metropolitan area, near an airport, killing citizens in their homes and on the streets.

Citizens' groups are petitioning officials to close both LaGuardia and Idlewild. Newark Airport was closed weeks ago by such public opinion, although the field may reopen to limited military traffic if planes do not fly over Newark and Elizabeth. These citizens are somewhat hysterical, true, but they did close down Newark Airport.

What is the future of airports which are surrounded by built-up areas? There is no simple short-term answer, because none of us can deny that there have been four serious crashes in the New York area killing 14 citizens and endangering hundreds. What assurance does any citizen have that he won't be next? What assurance can we in aviation give him?

There is a long-term answer if we start to work quickly and convince the public we mean business. But it will take more than a committee of individuals from domestic airlines serving New York.

As we see it, this unexpectedly critical New York airport problem that has developed into a full-grown crisis in four months—except for the earlier months of complaint about noise—dramatically and forcibly reveals one more proof that everything in aviation depends on safety. Even economics!

If we don't start to expend now the proper amount of money, time and tremendous mental and physical energy to try to achieve unprecedented safety in aviation, we shall never cease colliding with ever new and bigger problems like this, while still flailing our arms over all the old problems we've had with us for years.

But it takes big decisions and big men to tackle this safety subject as it has never been grappled with in the past.

Neither commercial nor military aviation is giving the attention to safety that the subject demands. One reason for this is a simple lack of realization and understanding of the size and importance of the problem. We all have been paying lip service to safety for years. But if we don't really go all-out for it—government and industry leaders alike—and pay now for what we should be doing for safety, we will pay the piper many times over in the future.

Let the New York airport emergency be one lesson to us. If we can't learn to be good citizens in the cities, we shall be relegated to the sticks, sure as fate. No amount of flim flam will change this truism. It is inevitable.

New York is just one more warning. If we don't realize that everything in aviation depends on safety, we may find the public not only forsaking us and our planes, but hysterically demanding our shrinkage and removal from other places.

The airplane is here to stay, but its utility can be crippled and its growth hampered by a belligerent public opinion, and a lot of that public opinion is up to us in aviation.

When every airline has a vice president in charge of safety, and when top officers of government and industry and the military services get together constantly on the really big safety matters of design, manufacture, operation, research and other such subjects, to put the microscope on every phase of aviation and start overhauling, we'll be moving forward with assurance both to ourselves and to the public. There is much to be done.

Helping Reds Keep Their Secrets

Someone should do a story sometime on how military intelligence officers "think."

Since December, AVIATION WEEK has held unpublished much information this government has learned from detailed analysis of a Russian MiG-15, captured months ago. Secretary Finletter of the Air Force has told us he believes the data should be printed. Air Force Intelligence represented by Gen. Sanford has repeatedly refused to clear publication of this information, despite Mr. Finletter.

Now, Look Magazine has come up with a piece entitled, "Russians Don't Even Know How They Do It."

Look says the Air Force "decided the MiG was so good the Russians must have built it by accident. . . . It cannot be released because it might endanger the national security if the Russians got hold of it and found out how they built the plane. . . . They are going to have to hire some pretty slick spies if they want to steal the secret from us."

Meet the Issues, Admiral

There comes to us a memo that Adm. C. F. Horne, CAA Administrator, sent all regional administrators Mar. 19 that offers you another tip-off to the attitude of CAA toward its faults or criticism.

The Admiral's memo copies his telegram to us, contending that newspaper charges of liquor smuggling by CAA agents were "erroneous," and that he has "evidence on hand" to prove it. We published the Admiral's wire Mar. 31.

Then he tells his staff: "Other appropriate steps have been, and will be, taken to **counteract** the effects of these one-sided editorials."

WHY DOES THE ADMINISTRATOR TALK ABOUT "COUNTERACTING EFFECTS" INSTEAD OF ELIMINATING CAUSES?

We trust the Admiral further told his men about his later letter to us, which sidestepped not too neatly our request for his "evidence" and the names of his investigating committee.

Why don't you let us taxpayers look at your "evidence" and decide for ourselves what it "proves," Admiral?

—Robert H. Wood

klystrons

AT WORK IN THE LABORATORY

Sperry Klystron tubes are doing heavy duty in the labs where a practical source of continuous microwave energy is needed for general test and measuring work. A complete line of 2K tubes is available for bench oscillator use from 2660 to 10,300 mc.

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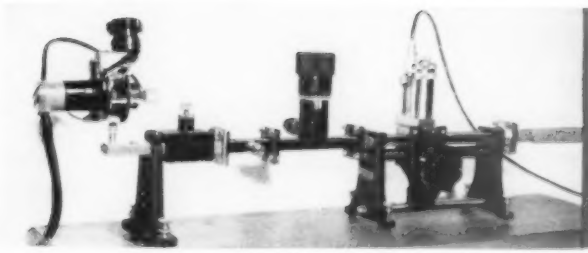
Sperry's pioneering in microwave measuring techniques has resulted in a complete line of Microline* instruments which includes every type of device essential to precision measurement, in the entire microwave field.

Our Special Electronics Department will be happy to supply you with complete details on Klystrons and Microline equipment.



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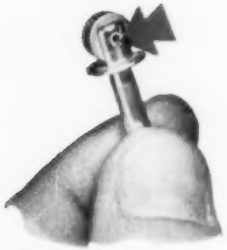
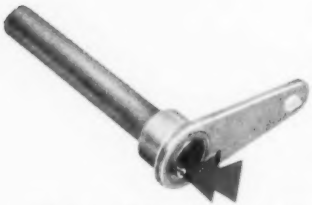


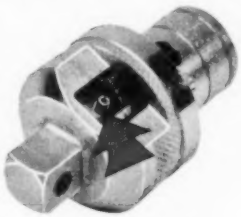
AS A SHAFT . . . Rollpin serves as an axle for the sparkwheel of a cigarette lighter. No riveting or threading necessary . . . faster assembly. Note flush, clean fit.

AS A DOWEL . . . Rollpin is used here to prevent rotation of a thrust bearing. No reaming, no special locking. Easily removed. Lowest possible dowel pin cost.

AS A CLEVIS PIN . . . here Rollpin holds firmly in clevis, permits free action of moving member. Rollpin application above is with the plate of a home workshop tool.



AS A KEY . . . Rollpin demonstrates its ability to do away with precision tolerances, in this heating system damper arm. Faster, cheaper and more satisfactory than usual assemblies.



AS A STOP PIN . . . in this application, Rollpin is shown in a ratchet wrench adaptor. With its light weight and high shear strength, Rollpin functions perfectly . . . cuts assembly costs.

AS A SIMPLE FASTENER . . . Rollpin replaces a set screw in pinning a gear to a shaft. Assembly time is shorter, service life longer. Vibration-proof flush fit. Easily removable.

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are cheaper . . . faster, with ROLLPIN TRADE MARK

Rollpin is a pressed-fit pin with chamfered ends. It drives easily into holes drilled to normal tolerances, compressing as driven. No reaming, no tapering, no extra assembly steps required. Rollpin fits flush, *locked* in place by the constant pressure it exerts against the hole walls. Can be inserted with automatic press, or by hand—removable with a drift or pin punch.

Rollpin is reusable again and again.

Elastic Stop Nuts with the famous red collar are another ESNA product

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Section R1-425, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

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- ☐ Rollpin bulletin and sample Rollpins
- ☐ AN-ESNA conversion chart
- ☐ Elastic Stop Nut Bulletin
- ☐ Here is a drawing of our product. What fastener do you recommend?

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